



# NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

## THESIS

**A NEW ROLE FOR LOCAL POLICE IN RADIOLOGICAL  
SECURITY**

by

Thomas Lee

September 2007

Thesis Advisors:

David Brannan  
Robert Simeral

**Approved for public release: distribution is unlimited**

THIS PAGE INTENTIONALLY LEFT BLANK

<b>REPORT DOCUMENTATION PAGE</b>			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
<b>1. AGENCY USE ONLY (Leave blank)</b>		<b>2. REPORT DATE</b> September 2007	<b>3. REPORT TYPE AND DATES COVERED</b> Master's Thesis	
<b>4. TITLE AND SUBTITLE</b> A New Role for Local Police in Radiological Security			<b>5. FUNDING NUMBERS</b>	
<b>6. AUTHOR(S)</b> Thomas Lee				
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Postgraduate School Monterey, CA 93943-5000			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A			<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>	
<b>11. SUPPLEMENTARY NOTES</b> The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release: distribution is unlimited.			<b>12b. DISTRIBUTION CODE</b> A	
<b>13. ABSTRACT (maximum 200 words)</b> <p>Since the 9/11 attacks, the possibility of another attack on America using radiological weapons has been a subject of much discussion both in the press, in national security and homeland security circles and in the academic literature. While much of the federal government's focus has been on preventing radiological material from being smuggled into the United States, this thesis examines the possibility of terrorists using materials that are readily available in medical, research and industrial locations. A dirty bomb or radiological dispersal device could have a devastating impact on the economy and greatly raise public fears.</p> <p>Local police agencies have previously not had a formal role in radiological security. This thesis explores policy initiatives, based on community policing principles conducted at the local police level, which will enhance security at locations where radiological materials are kept.</p>				
<b>14. SUBJECT TERMS</b> Radiological Security, Public-Private Partnerships, Intelligence Led Policing, Community Policing			<b>15. NUMBER OF PAGES</b> 87	
			<b>16. PRICE CODE</b>	
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified	<b>20. LIMITATION OF ABSTRACT</b> UU	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)  
Prescribed by ANSI Std. Z39-18

THIS PAGE INTENTIONALLY LEFT BLANK

**Approved for public release: distribution is unlimited**

**A NEW ROLE FOR LOCAL POLICE IN RADIOLOGICAL SECURITY**

Thomas F. Lee  
Deputy Superintendent Boston Police Department  
Boston, Massachusetts  
B.S., New England College, 1991

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES  
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL  
September 2007**

Author: Thomas F. Lee

Approved by: David Brannan  
Thesis Advisor

Robert Simeral  
Thesis Advisor

Douglas Porch  
Chairman, Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

## **ABSTRACT**

Since the 9/11 attacks, the possibility of another attack on America using radiological weapons has been a subject of much discussion both in the press, in national security and homeland security circles and in the academic literature. While much of the federal government's focus has been on preventing radiological material from being smuggled into the United States, this thesis examines the possibility of terrorists using materials that are readily available in medical, research and industrial locations. A dirty bomb or radiological dispersal device could have a devastating impact on the economy and greatly raise public fears.

Local police agencies have previously not had a formal role in radiological security. This thesis explores policy initiatives, based on community policing principles conducted at the local police level, which will enhance security at locations where radiological materials are kept.

THIS PAGE INTENTIONALLY LEFT BLANK



## TABLE OF CONTENTS

<b>I.</b>	<b>INTRODUCTION.....</b>	<b>1</b>
A.	<b>PROBLEM STATEMENT .....</b>	<b>1</b>
B.	<b>RESEARCH QUESTION .....</b>	<b>2</b>
C.	<b>LITERATURE REVIEW .....</b>	<b>3</b>
D.	<b>SIGNIFICANCE OF RESEARCH .....</b>	<b>7</b>
E.	<b>METHOD .....</b>	<b>8</b>
<b>II.</b>	<b>RADIOLOGICAL TERRORISM.....</b>	<b>9</b>
A.	<b>RADIATION .....</b>	<b>9</b>
B.	<b>THE RADIOLOGICAL TERRORIST THREAT .....</b>	<b>11</b>
C.	<b>HISTORY .....</b>	<b>11</b>
D.	<b>RADIOLOGICAL DISPERSAL WEAPONS (RDW’S).....</b>	<b>11</b>
E.	<b>RADIOLOGICAL DISPERSAL DEVICE .....</b>	<b>13</b>
F.	<b>“SMOKY BOMB” .....</b>	<b>15</b>
G.	<b>EXPERT PREDICTIONS.....</b>	<b>16</b>
H.	<b>RELIGIOUSLY MOTIVATED TERRORISTS .....</b>	<b>18</b>
I.	<b>TERRORIST GROUP ORGANIZATIONAL STRUCTURE .....</b>	<b>18</b>
J.	<b>THREATENED USES OF RADIOLOGICAL WEAPONS.....</b>	<b>20</b>
K.	<b>GOIANIA, BRAZIL .....</b>	<b>21</b>
L.	<b>THE ALEXANDER LITVINENKO CASE .....</b>	<b>22</b>
<b>III.</b>	<b>THE NEW POLICE ROLE IN DOMESTIC COUNTERTERRORISM.....</b>	<b>25</b>
A.	<b>HISTORY OF COMMUNITY POLICING .....</b>	<b>25</b>
B.	<b>POLITICAL ERA.....</b>	<b>26</b>
C.	<b>THE REFORM ERA .....</b>	<b>27</b>
D.	<b>THE COMMUNITY PROBLEM SOLVING ERA.....</b>	<b>28</b>
E.	<b>INTELLIGENCE-LED POLICING .....</b>	<b>29</b>
F.	<b>NEW POLICE ROLE: COUNTERTERRORISM .....</b>	<b>31</b>
G.	<b>REGIONAL INTELLIGENCE CENTERS .....</b>	<b>33</b>
H.	<b>COMMUNITY BASED COUNTERTERRORISM STRATEGY .....</b>	<b>34</b>
<b>IV.</b>	<b>SECURITY OF SOURCES .....</b>	<b>37</b>
A.	<b>ORPHANED SOURCES.....</b>	<b>40</b>
B.	<b>DOMESTIC NUCLEAR DETECTION OFFICE .....</b>	<b>42</b>
C.	<b>DEPARTMENT OF ENERGY .....</b>	<b>43</b>
D.	<b>FACILITY SECURITY .....</b>	<b>44</b>
<b>V.</b>	<b>POLICY ANALYSIS AND IMPLEMENTATION.....</b>	<b>49</b>
A.	<b>POLICE ROLE IN RADIOLOGICAL SECURITY.....</b>	<b>49</b>
B.	<b>POLICY OPTIONS ANALYSIS.....</b>	<b>50</b>
1.	<b>Option A.....</b>	<b>50</b>
2.	<b>Option B.....</b>	<b>50</b>
3.	<b>Option C.....</b>	<b>50</b>
C.	<b>POLICY RECOMMENDATION .....</b>	<b>52</b>

D.	THE FOUR ACTIONS FRAMEWORK: ELIMINATE, RAISE, REDUCE, AND CREATE GRID.....	54
E.	STRENGTHS, WEAKNESSES, OPPORTUNITIES AND CHALLENGES.....	55
F.	STRATEGY CANVAS.....	56
G.	MODEL POLICY IMPLEMENTATION PLAN.....	57
H.	CONCLUSION .....	58
IV.	FUTURE AREAS OF RESEARCH.....	63
	BIBLIOGRAPHY .....	65
	INITIAL DISTRIBUTION LIST .....	73

## LIST OF FIGURES

Figure 1.	NRC Sealed Sources Licensees [From GAO-03-804].....	37
Figure 2.	How the NRC Regulates [From the U.S. NRC] .....	40
Figure 3.	Source Status Concern Index [From Los Alamos National Lab] .....	46
Figure 4.	Strategy Canvas for Radiological Security [From Kim and Mauborgne] .....	56

THIS PAGE INTENTIONALLY LEFT BLANK

## LIST OF TABLES

Table 1.	Qualitative Assessment of the Risk of Radiological Terrorism [From Anet] .....	15
Table 2.	Three Historical Era's of Law Enforcement Evolution [From Kelling and Moore].....	36
Table 3.	Confirmed Incidents with Nuclear Material, 1993-2001 [From IAEA] .....	42
Table 4.	Values [From the NRC] .....	45
Table 5.	Policy Options Analysis Matrix [Adapted from Bardach] .....	51
Table 6.	Four Actions Framework Grid [From Kim and Mauborgne] .....	54
Table 7.	S.W.O.C. Analysis .....	55

THIS PAGE INTENTIONALLY LEFT BLANK

## I. INTRODUCTION

### A. PROBLEM STATEMENT

Many dangerous radiological sources are kept in hospitals, research facilities and industrial settings with relatively light security. Security in these facilities has typically focused on the danger of exposure to and safe handling of radioactive materials and not on these substances falling into the wrong hands. Conventional explosives combined with powerful (and available) radioactive elements such as cobalt 60, cesium 137, or iridium can create a “dirty bomb” or radiological dispersal device (RDD) capable of rendering an area uninhabitable for decades. Poorly protected radiological sources are tempting targets for theft by terrorists. Adding a radioactive component to a conventional bomb can magnify the fear, psychological trauma, panic, and financial disruption generated by an act of terrorism. Every year, approximately 250 radiological devices are reported lost or missing in America.<sup>1</sup> These radiological sources are much more readily available than most people realize.

A recent survey of homeland security experts identified a radiological dispersal device, or dirty bomb, as the most likely unconventional weapon to be used against the United States.<sup>2</sup> In 2005, Senator Richard Lugar, chairman of the United States Senate Foreign Relations Committee, commissioned a survey of eighty-five arms control and national security experts to assess the possibility of a chemical, biological, radiological, or nuclear attack on a western nation. These respondents also identified a “dirty bomb” as the most likely occurrence, estimating the risk at forty percent over the next decade.<sup>3</sup>

Local police agencies have not typically been involved in the protection of radiological materials; private security is directly responsible for securing these materials.

---

<sup>1</sup> United States Government Accountability Office, *Nuclear Security: Federal and State Action Needed to Improve Security of Sealed Radioactive Sources*, GAO-03-804, August 2003, 4.

<sup>2</sup> Center for American Progress and Foreign Policy Magazine Terrorism Survey, *Foreign Policy*, June 2006, [www.ForeignPolicy.org](http://www.ForeignPolicy.org), [Accessed March 13, 2006].

<sup>3</sup> Michael Richardson, “Weapons of Mass Disruption Await,” *New Zealand Herald*, October 6, 2005.

Federal and State regulators are charged with overseeing radiological security for certain licensees but significant gaps in security remain unfilled.<sup>4</sup>

A key element lacking in current radiological security is any partnership or collaboration with local law enforcement. This lack of collaboration results in a lack of coordination and information or intelligence sharing. Without a system or network of collaboration between law enforcement and private radiological security, there can be no uniform purpose or mission.

Law enforcement, traditionally, only becomes involved after materials have been stolen. Most first responders have no idea of the location of radioactive sources and materials in their jurisdictions. Since 9/11, police agencies have been asked to take on numerous new homeland security roles without corresponding increases in budgets. The police have been asked to take on these duties at a time of decreased staffing and increased crime.<sup>5</sup> This thesis addresses the challenges facing local police agencies in trying to prevent acts of radiological terrorism. This question is of importance not only to local law enforcement but also to radiological security professionals, the intelligence community, and homeland security planners and researchers.

## **B. RESEARCH QUESTION**

This thesis examines the issue of what role local police agencies should play in radiological security and poses these two research questions:

- 1) How can local police intelligence centers be part of a police radiation security program?
- 2) How can local law enforcement agencies deal with increasing crime and reduced staffing levels and play a role in securing their jurisdictions from radiological attack?

---

<sup>4</sup> Charles D. Ferguson and Joel O. Lubenau, "Securing U.S. Radioactive Sources," *Issues in Science and Technology* 20, no. 1 (Fall 2003): 67.

<sup>5</sup> James Alan Fox, "Wall Needed Between Politics and Policing: President's Commitment to Constabulary is Cop Out," *Boston Herald*, July 17, 2006, 23.



## C. LITERATURE REVIEW

Local police departments have not previously had a formal role in protecting radiological materials. The United States Nuclear Regulatory Commission has issued new guidelines for securing radioactive materials of certain quantities.<sup>6</sup> These guidelines require licensees to collaborate with local law enforcement on security for radioactive materials and give local law enforcement a new formal role in radiological security. A review of recent scholarly journals and research databases found no relevant studies on the topic. While there is no research published yet on this area, there is extensive literature on “dirty bombs” and the threat of terrorists using radiological dispersal devices; this thesis makes use of that material.

There is disagreement among experts about the threat from a dirty bomb. Stephen Pincock, who writes for *The Scientist*, argues that the fear of dirty bombs is overblown, as no one knows what would happen, because no one apparently has ever set one off.<sup>7</sup> Other experts have alleged that the former government of Iraq, and also al Qaeda, have both experimented and attempted to detonate dirty bombs.<sup>8</sup> Charles Ferguson, a noted author on the threat of nuclear and radiological terrorism, calls dirty bombs “weapons of mass disruption,” as opposed to weapons of mass destruction.<sup>9</sup> Ferguson finds the devices are primarily a means to spread panic and fear rather than death and destruction. Other researchers do label dirty bombs as weapons of mass destruction because the long term environmental clean-up results in an effective loss of the impacted area for possibly

---

<sup>6</sup> Nuclear Regulatory Commission, “In the Matter of all Licensees Authorized to Possess Radioactive Material Quantities of Concern, Order Imposing Increased Controls,” *Notices*, Attachment A, Federal Register 71, no. 98 (May 22, 2006). Author’s note: Attachment A contains sensitive information and will not be released to the public.

<sup>7</sup> Stephen Pincock, “Terrorists Using ‘Dirty Bombs’ to Spread Radiation are a Chilling Prospect. But is the Fear Justified by the Actual Danger They Pose?” *Financial Times*, September 10, 2004, 13.

<sup>8</sup> Michael P. Donohue, “Understanding the Dirty Bomb and Its Policy Implications,” *Homeland Security Law and Policy*, William C. Nicholson ed. (Springfield, Il: Charles C. Thomas, 2005), 278.

<sup>9</sup> Karen Eschbacher, “Experts Say Dirty Bombs are more Disruptive than Destructive,” *Patriot Ledger*, January 20, 2005.

decades, while increased cancer rates, resulting in casualties years after the event has taken place, could lead to enormous financial costs.<sup>10</sup>

Andy Oppenheimer is a specialist in nuclear, biological and chemical weapons. In a special report in *Jane's Terrorism and Security Monitor*, which is a highly regarded open source intelligence channel, Oppenheimer challenges the view of Ferguson and other experts that an RDD is not a weapon of mass destruction. He reevaluates the threat based on expert intelligence opinion and in marked contrast to previous assessments predicts that terrorists could kill hundreds with an RDD and sicken thousands using radioactive materials that are readily available in commercial and medical use.<sup>11</sup>

Several terms are used interchangeably in the literature on radiological weapons, which creates some confusion. Andrew Grotto, in "Defusing the Threat of Radiological Weapons: Integrating the Prevention with Detection and Response," clarifies the distinctions between radiological terrorism and nuclear terrorism. Further distinctions are noted in Andrew Karan's research between radiological weapons, radiological dispersal devices, and radiological poisoning, all separate tactics of radiological terrorism.<sup>12</sup>

Nuclear terrorism is a separate threat and concerns either the development or acquisition, by terrorists, of a nuclear weapon that is capable of exploding from a chain reaction created by fissionable material. A comprehensively researched RAND case study on nuclear terrorism, by Sara Daly, John Parachini and William Rosenau, argues that developing or purchasing black market nuclear weapons is much more difficult than generally believed. Many nations have struggled for decades to develop nuclear weapons. Despite all of the media hype about "suitcase nukes," these weapons and fissionable

---

<sup>10</sup> Anonymous, "Dirty Bomb Seen Creating Mass Havoc, According to Year Long Pentagon Study," *Law Enforcement News* 30, no. 616 (Spring 2004), 6.

<sup>11</sup> A. Oppenheimer, "The Radiological Threat Widens," *Jane's Terrorism and Security Monitor, Special Report* (September 1, 2004).

<sup>12</sup> P. Andrew Karan, "Radiological Terrorism," *Human and Ecological Risk Assessment*, 11 (2005): 503.

material are difficult to obtain; even the best-financed terrorist groups such as al Qaeda and Aum Shinrikyo have been unable to build or buy a nuclear device on the black market.<sup>13</sup>

Finally, there are numerous technical difficulties in constructing a nuclear weapon.<sup>14</sup> The literature describes the daunting task a terrorist group faces in constructing a nuclear device. A dirty bomb, or radiological dispersal device, on the other hand, is relatively easy to construct and offers the fear and propaganda value of a nuclear weapon, if not the destructive power. Operationally, for a terrorist, a dirty bomb is a realistic weapon; instructions are openly available over the internet. The Islamic militant online forum Alghorabaa.net, a website that has been used by Al Qaeda and Iraqi insurgents, recently posted instructions in Arabic on how to make a dirty bomb.<sup>15</sup>

Some authors, such as Brian Jenkins, have questioned terrorist predilections toward weapons of mass destruction or the use of chemical, biological, or nuclear weapons. Bruce Hoffman, a renowned expert on terrorism, argues persuasively that religiously motivated terrorists are more likely to use these types of weapons than secular or ethnic terrorists.<sup>16</sup>

The literature on the role of local police in fighting terrorism has grown considerably since 9/11. Police agencies have been assigned new anti-terrorism roles such as protecting critical infrastructures and key resources. Unfortunately, numerous studies identify insufficient resources and falling manpower levels as impediments to carrying out these new roles. Los Angeles Police Chief William Bratton has warned that police agencies are abandoning successful community policing programs as they focus

---

<sup>13</sup> Sara Daly, John Parachini, and William Rosenau, "Aum Shinrikyo, Al Qaeda and the Kinshasa Reactor, Implications of Three Case Studies for Combating Nuclear Terrorism," *Project Air Force Research Brief* (Santa Monica, CA: RAND Corporation, 2004), viii. [www.rand.org](http://www.rand.org), [Accessed May 6, 2007].

<sup>14</sup>Ibid.

<sup>15</sup>Staff, "Al Qaeda Publishes Online Dirty Bomb, How to Guide," *U.S. Fed News*, September 1, 2006, Newswire Service.

<sup>16</sup> Bruce Hoffman, *Inside Terrorism*, Revised and Expanded Edition (New York: Columbia University Press, 2006), 269.

heavily on preventing terrorism.<sup>17</sup> At the same time, local police agencies face a rising crime rate. The FBI Uniform Crime Reporting (UCR) Program reports that violent crime is rising in the United States after having fallen for the past ten years.<sup>18</sup> The Police Executive Research Forum has published a study indicating that the redirection of federal resources to homeland security has left cities more vulnerable to violent crime, and that police efforts need to be directed at reducing both street violence and terrorism.<sup>19</sup>

Much of the current scholarly research on the police role in preventing terrorism examines the role of local police intelligence. An excellent study by the RAND Corporation, *State and Local Intelligence in the War on Terrorism*, examines state and local law enforcement's counter-terrorism intelligence activities, and finds that activities are tied to perceived risk.<sup>20</sup> The study also finds that fusion centers are being developed at the state level, along with regional intelligence centers in major urban areas. Local agencies such as the Los Angeles Terrorism Early Warning Group (TEW) and the Boston Regional Intelligence Center (BRIC) are being recognized nationally for breaking new ground in the prevention of terrorism.<sup>21</sup>

Private security efforts and effectiveness have been challenged by researchers. The United States Government Accountability Office has been critical of the security of sealed radiological sources, which are often kept in medical, research, and industrial settings.<sup>22</sup> The Congressional Research Service has questioned the capabilities, training,

---

<sup>17</sup> Gregory Smith, "Community Policing Guru Issues Warning," *Providence Journal*, March 2, 2006.

<sup>18</sup> Federal Bureau of Investigation, *Crime in the United States 2005* (Washington, DC: United States Department of Justice, September 2006), 3.

<sup>19</sup> Chuck Wexler, *A Gathering Storm: Violent Crime in America* (Washington, DC: Police Executive Research Forum, 2006), 2.

<sup>20</sup> K. Jack Riley, Gregory F. Treverton, Jeremy M. Wilson, and Lois M. Davis, *State and Local Intelligence in the War on Terrorism* (Santa Monica CA: RAND Corporation, 2005), 3.

<sup>21</sup> John P. Sullivan, "Terrorism Early Warning and Co-Production of Counterterrorism Intelligence," Research Paper presented at the Canadian Association for Security and Intelligence Studies International Conference on October 21, 2005 in Montreal, Canada, 1.

<sup>22</sup> United States Government Accountability Office, "Nuclear Security: Federal and State Action Needed to Improve Security of Sealed Radioactive Sources," GAO-03-804 (August 2003), 2.

qualifications, and background checks of private security personnel charged with guarding critical infrastructure and key industries.<sup>23</sup>

In “Parallels Between Community Oriented Policing and the War on Terrorism: Lessons Learned,” William V. Pelfrey Jr. identifies the Community Oriented Policing theory as a basis for creating a local policing counter-terrorism strategy. Newspaper articles from police chiefs around the United States have also identified community policing as a foundation for homeland security. Articles such as “Community Policing Has Security Benefits,”<sup>24</sup> which appeared in the *Ventura County Star*, and “Better Community Policing Would Improve Security,”<sup>25</sup> by Australian Attorney General Phillip Ruddock in the *Financial Times*, have championed the concept of community policing as an anti-terrorism strategy. Noted criminologist George Kelling and Los Angeles Police Chief William Bratton have co-authored an article, “Policing Terrorism,” for the Manhattan Research Institute, recommending that successful community policing techniques be adapted for the war on terror.<sup>26</sup> Could these be a model for local police efforts in radiological security?

#### **D. SIGNIFICANCE OF RESEARCH**

President Bush, in his message to Congress on the need to create a new Cabinet Department of Homeland Security, stressed the need for cooperation among all levels of government – particularly local government and public safety agencies – to protect the nation against the “most deadly weapons known to mankind:” chemical, biological,

---

<sup>23</sup> Paul W. Parfomak, “Guarding America: Security Guards and U.S. Critical Infrastructure Protection,” Congressional Research Service, RL 32670, November 12, 2004 2.

<sup>24</sup> Chief Patrick Miller, “Community Policing Has Security Benefits,” *Ventura County Star*, February 12, 2005.

<sup>25</sup> Philip Ruddock, “Better Community Policing Would Improve Security,” *Financial Times*, Australian Associated Press Newsfeed, July 31, 2005.

<sup>26</sup> George L. Kelling and William J. Bratton, “Policing Terrorism,” *Civic Bulletin No.43*, September 2006, 2.

radiological and nuclear threats.<sup>27</sup> The research presented in this thesis identifies a new policy model for local police agencies to aid in the prevention of radiological attacks by working in partnership with private security.

This thesis will be of interest to local law enforcement agencies, state radiation control programs, and federal regulatory commissions. Additional research on measuring the effectiveness of the recommended policy options is recommended. The partnership approach versus the increased compliance by stricter regulatory controls can be examined as states enact different schemes to enhance security. This thesis may also benefit scholars researching comparative anti-terrorism strategies and future applications of community policing and intelligence-led policing.

## **E. METHOD**

The policy options analysis method is utilized to analyze different implementation alternatives for a local police radiological security role. The applicability, feasibility, and sustainability of each option is evaluated and a cost benefit analysis conducted. A qualitative assessment matrix is constructed; possible negative consequences and potential degrees of effectiveness are measured.

The problem of radiological materials being poorly secured is identified through the review of government reports. The concept of using the community policing philosophy as a basis for a local police strategy for radiological security is proposed as a solution. A model policy for local police agencies to follow is presented along with policy implementation recommendations.

---

<sup>27</sup> George W. Bush, "Message to the Congress of the United States on Proposed Legislation to Create a New Cabinet Department of Homeland Security," June 18, 2002, [www.whitehouse.gov](http://www.whitehouse.gov), [Accessed March 15, 2007].

## II. RADIOLOGICAL TERRORISM

*We must face the brutal reality that no technical remedies can provide complete confidence that we are safe from radiological attacks*

*Dr. Henry Kelly*<sup>28</sup>

On June 10, 2002, Attorney General John Ashcroft stunned the country with this statement: “I am pleased to announce today a significant step forward in the war on terrorism. We have captured a known terrorist who was exploring a plan to build and explode a radiological device, or ‘dirty bomb’ in the United States and is being held as an enemy combatant.”<sup>29</sup> The term “dirty bomb” quickly became part of the nation’s lexicon with the arrest of José Padilla, a former Chicago gang member who became an al Qaeda associate. While many civil libertarians have questioned the subsequent continued detention and extraordinary legal treatment of an American citizen as enemy combatant, his arrest dramatized a new threat for the American homeland: radiological terrorism. How much of a threat a radiological device poses for American security has been questioned. The media broadcast images of a mushroom cloud in conjunction with the story but the reality is that a “dirty bomb” is not a nuclear weapon. The threat has raised the public’s fear of a radiological attack. In order to fully examine the threat, it is helpful to first briefly review the characteristics and capabilities of radiation.

### A. RADIATION

Radiation is poorly understood by the public and by many public safety personnel. Radiation is a form of energy. We are surrounded by radiation from many sources. The sun’s rays warming the earth are a form of radiation. Background radiation occurs naturally in the environment and is always present at some level.

---

<sup>28</sup> Dr. Henry Kelly, President of the American Federation of Scientists, Testimony before the Senate Foreign Relations Committee March 6, 2002, [www.fas.org/maincontent](http://www.fas.org/maincontent), [Accessed March 27, 2007].

<sup>29</sup> Tony Kahron, “Person of the Week: Jose Padilla,” *Time*, June 14, 2002.

Atoms are the basic building blocks of matter. Most atoms are stable. A few are unstable or radioactive. The type of radiation we need to be concerned about comes from radioactive atoms. A radioactive atom emits radioactivity because the nucleus has too many particles, too much energy, or too much mass to be stable.<sup>30</sup> The nucleus disintegrates in an attempt to reach a non-radioactive (stable) state. As the nucleus disintegrates, energy is released in the form of radiation. The decaying of the nuclei causes three types of radiation: alpha, beta, and gamma. Alpha radiation loses energy rapidly and is less likely to penetrate the skin and cause damage. Beta radiation travels faster and is capable of penetrating the skin and causing damage. Gamma radiation travels at the speed of light, is extremely penetrating, and causes serious radiation damage to internal organs.<sup>31</sup>

Most of the radiation training currently conducted centers on protection from radiation penetration. A sheet of paper can stop alpha radiation. Several layers of clothing will protect against beta radiation. However, several feet of solid material is needed to protect against gamma radiation. Besides shielding from a radioactive source, two other variables are important when dealing with radiation: time and distance. Radiation exposure guidelines have been developed primarily from what was learned from the survivors of Hiroshima and Nagasaki. Time and distance are critical factors for first responders to understand in dealing with radiation exposure. The closer a first responder is to a high radiation area the less time should be spent in the area.

First responders should also understand that radiation exposure is different from radiation contamination. A person who is exposed to radiation is not necessarily contaminated by radiation. A person who has received an x-ray has been exposed to radiation but is not contaminated by radiation.<sup>32</sup> A contaminated person has radioactive materials on or inside his or her body. This could be from breathing in radioactive

---

<sup>30</sup> Eric J. Hall, "Radiation and Life," [www.uic.com.au/ral.htm](http://www.uic.com.au/ral.htm), [Accessed February 11, 2007].

<sup>31</sup> Conference of Radiation Control Directors, *First Responders Guide, Radiological Dispersal Device*, CRCPD Publication #06-RDD-c, [www.crcpd.org](http://www.crcpd.org), [Accessed February 11, 2007].

<sup>32</sup> Center for Disease Control and Prevention, Department of Health and Human Services, Emergency Preparedness and Response, "Radioactive Contamination and Radiation Exposure." [www.bt.cdc.gov/radiation/contamination.asp](http://www.bt.cdc.gov/radiation/contamination.asp), [Accessed February 20, 2007].



material in the air or swallowing material. A person could be externally contaminated when the material is on a person's clothing or skin. A person who is contaminated by radiation could expose others to radiation.

## **B. THE RADIOLOGICAL TERRORIST THREAT**

What is the threat from radiological weapons? Media speculation and indeed much of homeland security training has focused on response to an attack by a weapon of mass destruction. Is this a real threat? The effectiveness of radiological dispersal weapons has been controversial. The most common incident has been the "dirty bomb scenario." Indeed, the Boston UASI region just conducted a major exercise, "Operation Poseidon," on June 20, 2006, that focused on the regional response to a dirty bomb incident at a large shopping mall. One criticism of current homeland security preparedness has been a focus on worst-case scenarios as opposed to realistic ones. Is radiological terrorism a legitimate threat?

## **C. HISTORY**

It is important to remember that there has never been a terrorist explosion of a "dirty bomb." Also, the concept of creating a radiological bomb or using radioactivity as a weapon is not new. General Douglas MacArthur proposed the idea of using radioactive material along the Chinese-Korean border to prevent further crossings of Chinese troops into Korea.<sup>33</sup> In 1941, the National Academy of Sciences first explored the idea of using conventional bombs to distribute radioactive material in enemy territory.<sup>34</sup> It has also been alleged that Saddam Hussein experimented with military uses of "dirty bombs" in the 1980s.

## **D. RADIOLOGICAL DISPERSAL WEAPONS (RDW'S)**

First, a distinction should be made between radiological terrorism and nuclear terrorism. The terms are often used indiscriminately by the press and even by some

---

<sup>33</sup> Karan, 501.

<sup>34</sup> Karan, 503.

homeland security professionals, but these are distinct terms. Radiological terrorism involves contamination by radioactive materials. Terrorists have explored or threatened to use several different tactics for dispersing or emitting these materials. A radiological dispersal device, (RDD) consists of conventional explosives surrounded by radioactive material. The explosion of the device spreads radioactive material throughout the blast field sickening or killing those exposed if sufficiently powerful radioactive material is used.

A radiological emitting device (RED) is a hidden source of radioactive material that can be used to sicken or kill people who pass close by it. Radiological poisoning entails placing radioactive material in food or water.<sup>35</sup> When radioactive material is used to contaminate livestock, fish, food crops, or water supplies it is referred to as a radiological dispersal weapon (RDW) and there can be a wide variety of means by which the agent is delivered – a direct attack on a nuclear facility, material spread by human agents, delivered by aerosol containers, or dropped from a crop duster airplane – any number of methods could be deployed. The U.S. Military does not provide official casualty predictions for radiological dispersal weapons due to the nature of the weapon and the many differences in time, proximity to source, method of exposure (whether inhalation or ingestion), and other variables which determine the effectiveness of the weapon. The Department of Defense does note that radiological weapons have enormous potential for intimidation.<sup>36</sup>

Nuclear terrorism is a separate threat and concerns either the development or acquisition of a nuclear weapon, by terrorists, capable of exploding from a chain reaction created by fissionable material. Many nations have struggled for decades to develop nuclear weapons. Despite all of the media hype about “suitcase nukes,” these weapons and fissionable material have been difficult to obtain. There are numerous technical difficulties in constructing a nuclear weapon. Even the best-financed terrorist groups

---

<sup>35</sup> Andrew J. Grotto, “Defusing the Threat of Radiological Weapons: Integrating Prevention with Detection and Response,” Research Paper, Center for American Progress, July 2005. [www.hsdl.org](http://www.hsdl.org), [Accessed June 2, 2007].

<sup>36</sup> Anthony H. Cordesman, *Defending America: Asymmetric and Terrorist Attacks with Radiological and Nuclear Weapons*, (Washington, DC: Center for Strategic and Industrial Studies, 2001), 18.

such as al Qaeda and Aum Shinrikyo were unable to build or buy a nuclear device on the black market.<sup>37</sup> The case studies suggest that developing or purchasing black market nuclear weapons is much more difficult than generally believed.<sup>38</sup>

## **E. RADIOLOGICAL DISPERSAL DEVICE**

As noted earlier, a dirty bomb, or radiological dispersal device, on the other hand is relatively easy to construct and generates the fear and propaganda value of a nuclear weapon if not the destructive power. In contrast to a nuclear device, the technical and operational capacity for construction and detonation of a dirty bomb are realistically obtainable by a terrorist group. Instructions are openly available over the internet. Conventional explosives can be combined with readily available radioactive elements that are common in industry and medicine. Cobalt 60, cesium 137 or iridium are powerful radioactive elements that are much more commonly available than most people believe. Various factors influence how effectively a radiological dispersal device will function such as, geographic area, wind and the strength of the radioactive material used in the weapon. A weapon of sufficient strength could render an area uninhabitable for decades. The overall social, political and economic ramifications of a successful radiological terrorist attack would be enormous regardless of the number of people killed in the initial explosion.<sup>39</sup>

The real benefit to a terrorist is the enormous fear, psychological trauma, panic, and financial disruption that such an attack would generate. Terrorist attacks result in more severe psychological consequences than other types of traumatic events due to the perceived lack of control by the public.<sup>40</sup> Chemical, biological, radiological, and nuclear

---

<sup>37</sup> Sara Daly, John Parachini and William Rosenau, "Aum Shinrikyo, Al Qaeda and the Kinshasa Reactor, Implications of Three Case Studies for Combating Nuclear Terrorism" *Project Air Force Research Brief* (Santa Monica CA: RAND Corporation, 2004, viii. [www.rand.org](http://www.rand.org), [Accessed June 12, 2007].

<sup>38</sup> Ibid.

<sup>39</sup> Martin C. Libicki, Peter Chalk, and Melanie Sisson, *Exploring Terrorist Targeting Preferences* (Santa Monica, CA: RAND Corporation, 2007), 83.

<sup>40</sup> Adrienne S. Butler, *Understanding the Psychological Consequences of Traumatic Events, Disasters and Terrorism* (Washington, DC: National Academy of Sciences, 2003), 45.

terrorism are believed to be particularly likely to cause psychological problems in a major portion of the population. These weapons are unfamiliar, the symptoms are usually undetectable (at least initially), and the public perceives this means of attack as being particularly reprehensible.<sup>41</sup> The media coverage would be international and undoubtedly sensational in its reporting. An RDD would be a formidable economic and psychological weapon in the hands of a terrorist.

Bernard Anet of the Spiez Laboratories in Switzerland conducted what is widely accepted as one of the definitive assessments of the qualitative risk of nuclear terrorism. Anet compared the technical feasibility, probability, and effects and damage of the various nuclear threats, and found that radiological terrorism had the highest risk factor.<sup>42</sup> The long-term psychological effects of radiological terrorism on the affected general public would be strongest as well. Anet found that radiological terrorism is the dominant threat in the context of nuclear terrorism.<sup>43</sup>

---

<sup>41</sup> Butler, 45.

<sup>42</sup> Bernard Anet, "Assessing the Risk of Radiological Terrorism, How Real is the Threat? Spiez Laboratory Research Paper presented at the Fourth Annual Chemical and Biological Treatment Symposium, Vienna,, April 2002, 7.

<sup>43</sup> Ibid.

Table 1. Qualitative Assessment of the Risk of Radiological Terrorism [From Anet]<sup>44</sup>

Option	Technical Feasibility: respectively Probability of occur. (P)	Effects and damage (E)				Risk (R)
		Area affected	Effects on Man's health	Environment/ Economics	Psychological Effects	
<b>IND-case</b> (home made bomb)	<b>extremely low</b>	large (<50 km <sup>2</sup> )	very large to catastrophic	disastrous	traumatic	<b>very low</b>
Attacking a <b>nuclear facility</b>	security measures make it <b>(very) difficult</b>	very large (< 100 km <sup>2</sup> )	limited	very large	tremendous	<b>very low</b>
<b>Radiological Terrorism</b> The “dirty bomb” case	Still difficult and a “high-tech” business but <b>feasible</b>	For <b><u>acute effects</u></b> local	small and limited	limited	the dominant effect	<b>medium</b>
		for <b><u>long term effects</u></b> large to very large	actually limited	large to very large especially on economics		<b>high</b>

## F. “SMOKY BOMB”

A new category of radiological dispersal device, termed a smoky bomb, has been recently proposed by Dr. Peter D. Zimmerman, a London nuclear physicist.<sup>45</sup> Such a

<sup>44</sup> Bernard Anet, “Assessing the Risk of Radiological Terrorism, How Real is the Threat? Spiez Laboratory Research Paper presented at the Fourth Annual Chemical and Biological Treatment Symposium, Vienna, April 2002, 6.

<sup>45</sup> Fred Burton, “Tactical Implications of the ‘Smoky Bomb’ Threat,” *Stratfor*, 2 January 2007. [www.isinreports@mindspring.com](http://www.isinreports@mindspring.com), [Accessed March 16, 2007].

device would be constructed in the form of an improvised incendiary device (IID) as opposed to an improvised explosive device (IED). One perceived drawback to a terrorist use of dirty bombs in the past was that they would not result in mass casualties – only in mass panic. Zimmerman conceives a device that would disperse radioactive material through smoke that would be inhaled into victims’ lungs. This smoke could produce acute radiation poisoning in lethal doses if deployed in an enclosed area such as a subway car. Even small doses of some radioisotopes would lead to cancer and other long term health problems for victims and first responders. A smoky bomb could spread radioactive particles farther than a dirty bomb and result in even greater panic and disruption.<sup>46</sup>

The use of an alpha emitter isotope such as Polonium 210, the material that was used to kill former KGB officer Alexander Litvinenko, has been proposed by Zimmerman as a material that could be used with deadly effects in such a weapon. Other isotopes such as Americium-241, are more commonly available in the United States and are used in a number of industrial and medical devices. Alpha radiation sources are not as tightly controlled as gamma radiation sources. A danger for first responders is that many standard radiation detectors are designed to detect only gamma radiation meaning the initial radiation hazard may not be recognized. The model for a smoky bomb would be the Chernobyl reactor fire in 1986. A large amount of radioactive material was released and carried across large parts of Europe. There were only thirty-two initial deaths from radiation exposure but many thousands more have reportedly died from the long-term effects of the exposure. The area around Chernobyl has still not been resettled due to high radioactive levels.

## **G. EXPERT PREDICTIONS**

A review of the various terrorist incident databases, such as the National Counterterrorism Center (NCTC) and the Memorial Institute for the Prevention of Terrorism (MIPT), reveal very few instances of radiological terrorism or other CBNRE

---

<sup>46</sup> Fred Burton, “Tactical Implications of the ‘Smoky Bomb’ Threat,” *Stratfor*, 2 January 2007. [www.isinreports@mindspring.com](http://www.isinreports@mindspring.com), [Accessed March 16, 2007].

terrorism.<sup>47</sup> However, despite the threat being comparatively small, it is real. A recent survey of over 100 terrorism and national security experts, conducted by *Foreign Policy* magazine, asked them to rate the top threat to American national security.<sup>48</sup> The experts rated nuclear weapons as the top threat followed closely by weapons of mass destruction and then terrorism. As to what type of terrorist attack was most likely to occur next in America, 67% indicated a suicide bomber followed by 20% who believed a radiological weapon would be the most likely. Experts also identified a radiological dispersal device or dirty bomb as the most likely unconventional weapon to be used against the United States.

Besides the technical difficulties and government controls of radioactive materials, there are political, moral, and psychological factors that have prevented terrorist groups from using these weapons in the past. Ethno-national groups, such as the IRA, certainly have the operational know-how and ability to carry out a radiological attack. However, ethno-national groups are extremely unlikely to use these weapons in their own areas for fear of contamination of the land that they are trying to gain control of and because of the indiscriminate nature of these weapons. They are just as likely to harm or kill their own population. The effects on the group would be reduced popular support and, likely, reduced financial support. State-sanctioned terrorists may also be reluctant to use these weapons because sponsor states fear retaliation. An unconventional radiological attack may harm their cause politically more than help it.

The conventional academic view of terrorists' use of CBRNE weapons was probably best espoused by Brian Jenkins: "Terrorists want a lot of people watching and a lot of people listening, not a lot of people dead."<sup>49</sup> This view has certainly changed since 9/11. Terrorists do seek mass casualties. In light of the 9/11 attacks, the continuing

---

<sup>47</sup> Memorial Institute for the Prevention of Terrorism (MIPT), Terrorism Knowledge Base, <http://www.tbk.org/> and National Counterterrorism Center, (NCTC) <http://www.nctc.gov/>, [Accessed June 14, 2007].

<sup>48</sup> Center for American Progress and Foreign Policy Magazine Terrorism Survey, *Foreign Policy*, June 2006. [www.ForeignPolicy.org](http://www.ForeignPolicy.org), [Accessed September 19, 2006].

<sup>49</sup> Hoffman, 269.

situation in Iraq, and the hotel bombings in Amman, mass casualties inflicted in a spectacular fashion is certainly an objective of some terrorist groups.

## **H. RELIGIOUSLY MOTIVATED TERRORISTS**

Secular terrorists may still refrain from the use of these weapons but the mindsets of religiously motivated terrorists, as Hoffman points out, makes them more likely to use these weapons.<sup>50</sup> The psychological process of the group's demonizing and dehumanizing of their targets and the belief that they are carrying out "god's will" all contribute to the group's potential use of mass-casualty weapons. Moral and religious constraints on killing large numbers of innocent victims are overcome by receiving clerical "sanctions" for the use of these weapons. Osama Bin Ladin's seeking of clerical sanctions to use nuclear weapons has been widely reported and al Qaeda has publicized to their followers that religious advisors have approved the use of these weapons against infidels. The radical Muslim scholar Sheik Nasir bin Hamad al-Fahd has published a treatise justifying the use of weapons of mass destruction and the indiscriminate killing of civilians.<sup>51</sup>

Hoffman has pointed out that the new generation of religiously inspired terrorists, with their deliberately less cohesive organizational structures and opaque command and control relationships, represent a different and potentially more lethal threat than more traditional terrorist adversaries.<sup>52</sup> The moral, psychological, and political constraints that have kept ethno-national groups or left-wing international terrorists from using these weapons will not prevent the new generation of religious terrorists from using them.

## **I. TERRORIST GROUP ORGANIZATIONAL STRUCTURE**

John Arquilla is recognized for his leading role in the application of network theory to explain the structure of terrorist organizations and other non-traditionally

---

<sup>50</sup> Hoffman, 271.

<sup>51</sup> Noah Feldman, "Islam, Terror and the Second Nuclear Age," *New York Times Magazine*, October 29, 2006.

<sup>52</sup> Hoffman, 271.



structured, non-hierarchical groups. The loose network structure of the organizations of these groups that Arquilla describes as waging “netwar” will make it more difficult to predict their behavior or defend against it. “These protagonists are likely to consist of dispersed organizations, small groups and individuals who communicate, coordinate and conduct their campaigns in an internetted manner, often without precise command and control.”<sup>53</sup> The decentralized decision making, tactics, and strategies make analysis of the group’s possible actions extremely complicated. The planning, financing, operational tactics, and target selection may be entirely carried out by a small local group. Their actions may seem to be “irrational” or in opposition to what is assumed to be the main group’s or movement’s overall strategy. Even if the leadership of al Qaeda opposed the use of radiological weapons, the autonomous cells they are inspiring may act on their own to employ such a weapon. Tactics are no longer “approved” by a central command or leader as they have been in the past. At the local level, availability of materials, technical skill, and cost may drive the decision to use an RDD. As a recent RAND study on terrorist targeting preferences noted, there are myriad sources of material inside the United States in research stations, medical facilities (particularly radio-therapy clinics), and commercial sites that could be used for this purpose.<sup>54</sup> These venues lack the type of rigorous security found at military installations and nuclear power plants.<sup>55</sup>

Homegrown terrorists, such as the seven individuals recently arrested in Miami for plotting to blow up the Sears Tower in Chicago, may have no real direct connection to groups such as al Qaeda but are simply inspired to launch terrorist attacks by propaganda disseminated through the internet.<sup>56</sup> They are al Qaeda loyalists, but have not physically interacted with other members of the organization.<sup>57</sup> While this group may not pose as significant a threat as first reported, they are representative of the fourth generation

---

<sup>53</sup> John Arquilla and David Ronfeldt, *Networks and Netwars: The Future of Terror, Crime and Militancy*. (Santa Monica CA: Rand Corporation, 2001).

<sup>54</sup> Libicki, Chalk and Sisson, 82.

<sup>55</sup> Ibid.

<sup>56</sup> Clark Kent Ervin, “The Usual Suspects”, *The New York Times*, Op Ed, June 27· 2006.

<sup>57</sup> Giovanna Dell’Orto, “Alleged Terrorist Plot Detailed,” *Boston Globe*, June 30, 2006, A7.

warfare we will have to confront in the 21<sup>st</sup> century.<sup>58</sup> Dealing with networks that represent a “movement” rather than a terrorist organization will challenge us to craft new and appropriate prevention strategies, military responses, and foreign policy. The increased diversity of the decision makers may influence target selection, tactics, and weapon selection to a much greater extent than has been seen in traditionally organized terrorist groups.

## **J. THREATENED USES OF RADIOLOGICAL WEAPONS**

One group that has threatened the use of radiological devices is the Chechen resistance movement. During 1995 and 1996, Shamil Basayev made a series of threats to detonate containers of radioactive material in Russian cities.<sup>59</sup> Basayev is the principal military leader of the Islamic elements of the Chechen resistance. In a televised threat, he displayed containers of material that he claimed were radioactive. Basayev appeared to be using the threat of an RDD as a psychological warfare tactic. In 1996, he told Russian authorities where to find a container of cesium-137 that he had buried in Moscow’s Izmailovskiy Park.<sup>60</sup>

In addition to the arrest of Jose Padilla for allegedly planning a dirty bomb attack, a second separate group of Islamic terrorists with links to al Qaeda was arrested by British authorities in August 2004 for planning to conduct dirty bombs attacks in England. The leader of the group, Dhiren Barot, had traveled to America to conduct reconnaissance on major U.S. financial sites.<sup>61</sup> In addition to Barot, six other suspects were recently convicted in connection with this plot.

---

<sup>58</sup> Combating Terrorism Center, *Harmony and Disharmony: Exploiting al-Qa’ida’s Organizational Vulnerabilities*, (Washington, DC: Department of Social Services, United States Military Academy, February 14, 2006), 8.

<sup>59</sup> Jeffrey M. Bale, “The Chechen Resistance and Radiological Terrorism,” Nuclear Threat Initiative website, [www.nti.org/](http://www.nti.org/), [Accessed March 7, 2007].

<sup>60</sup> Ibid.

<sup>61</sup> Adam Zagorin and Elaine Shannon, “London’s Dirty Bomb Plot,” *Time*, October 3, 2004.

## **K. GOIANIA, BRAZIL**

There have been no documented explosions of a radiological dispersal device by terrorists. A radiological incident in Goiania, Brazil in 1987 has been used by researchers as an illustration of the possible effects of the use of a radiological weapon against a civilian population. A radiation cancer treatment center, the Instituto Goiania de Radioterapia, moved to a new location leaving a radiation therapy unit behind. The teletherapy unit contained cesium 137. The center was licensed by the Brazilian government for sealed sources. Two scrap metal hunters disassembled the unit and removed the source. The source material glowed blue in the dark. Several rice size pieces of the material were distributed to families. The source assembly unit was sold to a scrap metal dealer. The source material consisted of 1400 Ci of cesium chloride salt.<sup>62</sup>

Several people quickly became ill after being externally exposed or internally contaminated from eating after handling the material. Tragically, some of the children spread the material over their skin after being fascinated by how it glowed in the dark. As more people fell ill, an alert doctor recognized the symptoms of radiation poisoning.

The incident resulted in one of the worse radiation accidents on record. Four people died, and an additional 249 were found to be contaminated. The incident caused widespread panic and more than 112,000 people sought radiation testing. A large testing facility was set up in the city's Olympic Stadium to handle the crowds. The immediate area of contamination was roughly forty city blocks. Eighty-five homes in this area were found to be significantly contaminated. Through routine travel, people coming into contact with the material contaminated homes 100 miles away.

A large environmental cleanup of the area was conducted at a cost of twenty million dollars. The tourism industry collapsed and businesses suffered as people

---

<sup>62</sup> International Atomic Energy Commission, *The Radiological Accident in Goiania* (Vienna, Austria: IAEA, 1988), 13.

avoided the region. The total economic damages were estimated to be in the hundreds of millions of dollars. Long-term health effects were found in the population in the form of greatly increased cancer rates.<sup>63</sup>

The most significant result of this incident was its profound psychological effect, causing fear and depression in the city's residents. Many people feared they were contaminated or irradiated and would suffer incurable diseases. More than 8,000 people requested monitoring for contamination in order to obtain certificates that they were not contaminated.<sup>64</sup> These were needed because operators of commercial aircraft and buses would refuse to allow people from the region to board due to fear of contamination. Hotels would also not allow people from this region to register without a certificate. The incident has so profoundly psychologically affected the area that the international symbol for radioactivity has been incorporated into the region's flag.<sup>65</sup>

This is strikingly similar to the effects found after the 1986 Chernobyl accident in Russia. "Radiophobia" or "Chernobyl Syndrome" swept across Russia after the accident.<sup>66</sup> The resulting fear and depression grew rather than diminished over the years and still affects the population. The accident revealed the inherent danger of sealed sources. So-called "orphaned" or abandoned sources exist in the United States just as they do in other countries.

## **L. THE ALEXANDER LITVINENKO CASE**

The recent murder of Alexander Litvinenko by poisoning with the radioactive isotope polonium 210 may be the first case of state-sponsored radiological terrorism. It is certain to draw the attention of terrorists. The case caused a sensation in Britain and led to thousands of people seeking testing for radiation exposure. A total of fifteen people were found to have been exposed to sufficient levels of polonium 210 to warrant a health

---

<sup>63</sup> International Atomic Energy Commission, 21.

<sup>64</sup> United States Government Accountability Office, *Nuclear Nonproliferation: U.S. and International Efforts to Control Sealed Sources Need Strengthening*, GAO003-638 (Washington DC: GAO, 2003), 77.

<sup>65</sup> Ibid.

<sup>66</sup> Laurie Garrett, *Betrayal of Trust: The Collapse of Global Public Health* (New York: Hyperion, 2000), 148.

risk and are being treated. The investigation revealed that twelve locations and two planes tested positive for radiation and had to undergo decontamination procedures. Polonium 210 is a highly radioactive isotope with a relatively short half-life of 138 days. It is used commercially in extremely small quantities. Almost all of the polonium 210 produced in the world is manufactured in Russian nuclear reactors and then distributed by licensed western commercial distributors. The amount of polonium that was used to poison Litvinenko was many times greater than what was needed as a fatal dose. Polonium 210 is expensive to manufacture; the monetary value of the amount of the substance used to kill Litvinenko was several million dollars.

The investigation is still active but several factors indicate state involvement. The link to Russia of the exposed aircraft; the two suspected former Russian Federal Security Service agents that Litvinenko met with in a London hotel; the substance itself, which is produced in Russia; and the fact that the means of death may have been intended as a message to the Russian expatriate community in Britain. (The two former FSB agents are also both reportedly being treated for acute radiation exposure in Russia. British authorities recently announced that they would seek to extradite one of the former FSB agents, Andrei Lugovoy, and charge him with the murder of Litvinenko).<sup>67</sup>

If the assassination of Litvinenko was carried out on the Kremlin's behalf, it would certainly be an act of political terrorism. Polonium 210 is one of the isotopes that has been identified as being the most effective in creating a RDD. The Litvinenko murder-by-radiation poisoning serves as an example to potential terrorists of the widespread media coverage to be gained from using radiological materials, the intense fear that resulted in thousands seeking to be tested after they believed they had been exposed, and the lingering psychological effects that have resulted from the incident. One former intelligence officer, Mark Galeotti, called the case an example of the "theater of assassination" where the method of killing by using a radioactive isotope was meant to

---

<sup>67</sup> Kim Murphy, "Ex-KGB Agent Sought on Poisoning Death," *Los Angeles Times*, May 24, 2007.

be a big media story and was clearly designed as a warning to the exiled Russian community in Britain that they are not beyond the Kremlin's reach.<sup>68</sup>

---

<sup>68</sup> Bob Simon, "Who Killed Alexander Litvinenko?" *CBS News*, London, January 7, 2007. [www.cbsnews.com/stories/2007/01/05/60minutes/printable233307.shtml](http://www.cbsnews.com/stories/2007/01/05/60minutes/printable233307.shtml), [Accessed January 8, 2007].

### **III. THE NEW POLICE ROLE IN DOMESTIC COUNTERTERRORISM**

Since the 9/11 attacks, there has been much discussion on what role local police agencies should have in homeland security. How can the more than 700,000 local police officers and 18,000 state and local police agencies best protect their communities and contribute to securing the nation as a whole from terrorist attacks?<sup>69</sup> New potential terrorist threats involving radiological, biological, and chemical agents have emerged. A “dirty bomb” or radiological dispersal device has been identified as a low tech, high threat option for terrorist groups.

In addition to new counterterrorism responsibilities, police departments nationwide are dealing with a resurgence of violent crime. Boston had a 23 percent increase in homicides over the last two years, Philadelphia 22.4 and Seattle 25 percent.<sup>70</sup> The police have adapted their roles and style of policing over the years in response to changes in the community, technological advances, rising crime rates, public pressure, and judicial decisions. A new pressure, to defend and protect against terrorist attacks has been added since 9/11. As police develop strategies to handle their increased responsibilities, it is useful to review the evolution of local policing and the development of current community policing philosophy that guiding the majority of today’s local law enforcement organizations.

#### **A. HISTORY OF COMMUNITY POLICING**

Community policing traces its roots back to the creation of modern policing in New York, Philadelphia, and Boston in the mid-1850s. Formal structured law enforcement organizations were created in these cities based on the principles of Sir Robert Peel.

---

<sup>69</sup> United States Department of Justice, Bureau of Justice Statistics webpage, <http://www.ojp.usdoj.gov/bjs/>, [Accessed March 16, 2007].

<sup>70</sup> Suzanne Smalley, “Hub’s Rise in Deadly Violence Reflects a Disturbing U.S. Trend,” *Boston Globe*, March 9, 2007.

In 1829, Peel won approval from Parliament of a bill to create the London Metropolitan Police force. There was considerable fear of a police agency that would serve as an arm of the state to repress political opposition and curtail civil liberties. Peel's principles of law enforcement clearly established the police as members of the community: "The police are the public and the public are the police"<sup>71</sup>. The mission of the police was to prevent crimes from occurring. Another, often overlooked, recommendation of Peel's was the assignment of police officers to regular beats, defined geographic areas of responsibility. The French model of a national police force was rejected and local independent police departments were created. America adopted the British model of policing.

## **B. POLITICAL ERA**

Kelling and Moore describe three generally accepted periods in the development of modern American policing: the Political Era, the Reform Era, and the Community-Based Era.<sup>72</sup> The Political Era of policing began in the early 1900s as part of the spoils system of the early ward boss era. Politicians and political parties sought control over the police for the patronage system. Jobs in the police department were valued and were given out as political favors to supporters. The role of the police was still firmly rooted in the community. Police officers patrolled the cities primarily on foot.

The early city police provided a variety of services for the public and in many ways were the first governmental social services agency. The police in New York and Boston ran soup kitchens and fed the poor. They housed vagrants (the early homeless) and kept delinquents in order. The police dispensed "justice" informally often at the end of a nightstick, as opposed to in a courtroom. However, corruption was rampant in policing as it was across all levels of city government.

---

<sup>71</sup> Sir Robert Peel, "Peelian Principles," [http://www.en.wikipedia.org/wiki/Peelian\\_Principles](http://www.en.wikipedia.org/wiki/Peelian_Principles), [Accessed July 9, 2007].

<sup>72</sup> George L. Kelling and Mark H. Moore, "The Evolving Strategy of Policing," *Perspectives on Policing*, (Washington, D.C.: National Institute of Justice, 1988), 1.



### C. THE REFORM ERA

In 1931, the National Commission on Law Observance and Enforcement (popularly known as the Wickersham Commission after its chairman, former Attorney General George W. Wickersham) recommended a number of reforms in policing to President Hoover. The Commission's *Report on Lawlessness in Law Enforcement* detailed a host of brutal police practices (such as "the third degree" and other forms of torture during police interrogations) and pointed to the corrupting influence of political machine domination of police departments.<sup>73</sup> The Commission sought to reduce political influence in policing and professionalize the police with training and modern organizational principles.

Professional police practices were championed by Berkeley, California Police Chief August Vollmer and Chicago Police Superintendent O.W. Wilson during the 1930s. Their theory on reforming police departments was to separate the police from corrupting influences in the community and have the police patrol in cars as opposed to on foot. Police reformers sought to lessen political influence and control over police agencies.

Patrol cars were to rapidly respond to calls for service by the use of radio dispatchers. Traditional retrospective criminal investigations by detectives were an important crime fighting strategy. Police organizations could be centralized and the professionalism of policing using modern scientific methods was emphasized. The role of police officers became "crime fighters." The mission of policing was crime control. These theories of policing remained dominant for the next forty years.<sup>74</sup> The professional model of policing still exists in many agencies.

---

<sup>73</sup> National Commission on Law Observance and Enforcement, *Report on Lawlessness in Law Enforcement* (Washington, DC: Government Printing Office, 1931). [www.LexisNexis.com](http://www.LexisNexis.com), [Accessed February 15, 2007].

<sup>74</sup> O.W. Wilson's text, *Police Administration*, was used in police promotional exams well in to the 1990's. The text book has been recently updated with a new revision by James Fyfe and will probably continue to be influential in policing.

#### D. THE COMMUNITY PROBLEM SOLVING ERA

Following the riots and social upheaval of the 1960's, it was increasingly recognized that "divorcing" the police from the community was a bad idea. The release of the President's Commission on Law Enforcement and Administration of Justice in 1967 called attention to the need for the police to be more accountable to the public and to increase communication with the community.<sup>75</sup> Supreme Court decisions such as *Miranda v. Arizona* and *Mapp v. Ohio* forced changes in police procedures.

Several significant research experiments on the efficacy of police patrol tactics were conducted during the 1970s. The most significant was the Kansas City (Missouri) Preventive Patrol Experiment in 1973; its findings seriously challenged the beliefs of the professional model of policing. Preventive patrol was found to have little or no effect on reported crime, victimization rates, or citizens' perception of personal safety.<sup>76</sup> A study by the RAND Corporation on criminal investigations found that traditional detective work contributed little to investigations of property crime.<sup>77</sup> Patrol officers made the arrests and usually discovered any evidence that lead to future arrests during their initial response.

The experiments of Neighborhood Foot Patrol in Flint, Michigan, the Citizen Oriented Police Experiment in Baltimore County, Maryland and the research on Problem-Oriented Policing in Newport News, Virginia showed that the community oriented approach led not only to greater citizen satisfaction but also the involved officers reported to be more satisfied with the new approaches.<sup>78</sup> Two theories by respected criminologists, Herman Goldstein's "problem oriented policing" approach and Kelling's

---

<sup>75</sup> President's Commission on Law Enforcement and Administration of Justice, *The Challenge of Crime in a Free Society* (Washington, DC: Government Printing Office, 1967). [www.LexisNexis.com](http://www.LexisNexis.com), [Accessed February 15, 2007].

<sup>76</sup> William A. Geller ed., *Local Government Police Management, 3<sup>rd</sup> Edition* (Washington, DC: International City Management Association, 1991), 16.

<sup>77</sup> *Ibid*, 140.

<sup>78</sup> Charles R. Swanson, Leonard Territo and Robert W. Taylor, *Police Administration, Structures, Processes and Behaviors*, (New York: MacMillan Publishing Co., 1993), 20.

and Wilson's "Broken Windows" theory on fear and disorder were embraced by police officials and began the transformation of police agencies into "community policing" organizations.

## **E. INTELLIGENCE-LED POLICING**

The term "intelligence-led policing" is being increasingly used in police circles. While there is not currently a uniformly accepted definition of the term, and debate continues as to what it actually is, there is a growing consensus that the term describes police efforts to collect and analyze information to produce intelligence that will guide police decision making at the tactical and strategic levels. A basic definition is provided by Ratcliffe: "Intelligence-led policing is the application of criminal intelligence analysis as an objective decision making tool in order to facilitate crime reduction and prevention through effective policing strategies and external partnership projects drawn from an evidential base."<sup>79</sup>

The concept was first used in the United Kingdom in 1997 to describe the police operational practices of the Kent Constabulary to deal with a rising crime rate. The focus was on an increased use of intelligence, surveillance, and informants to target repeat offenders. The philosophical concept draws on both problem-oriented policing for the identification and analysis of root causes of crime and the accountability, geographic mapping, and statistical analysis of the crime data of CompStat.<sup>80</sup> The term and the new intelligence-driven philosophy of policing was quickly adopted by police agencies in not only England but in Australia, Canada, and the United States following the September 11 attacks.

There have been previous recommendations for establishing intelligence-led policing at the local and state police level by the International Association of Chiefs of Police in *Criminal Intelligence Sharing: A National Plan for Intelligence-Led Policing At the Local, State and Federal Levels*, and by the U.S. Department of Justice in

---

<sup>79</sup> Jerry H. Ratcliffe, "Intelligence-led Policing," *Trends and Issues in Criminal Justice*, April 2003. <http://www.aic.gov.au>, [Accessed February 15, 2007].

<sup>80</sup> Ibid.

*Intelligence-Led Policing: The New Intelligence Architecture.* While there is certainly a need for establishing a national intelligence plan for law enforcement, these plans recognize the longstanding barriers that hinder intelligence sharing; the different policies, technologies, and the “hierarchy” within law enforcement and intelligence communities; and the capabilities of law enforcement intelligence analysis.<sup>81</sup>

There are some concerns that intelligence-led policing may be a step away from the community policing model. Intelligence-led policing has a centralized hierarchical organizational command structure as opposed to the decentralized structure of true community policing organizations. Also, intelligence-led policing determines priorities through an objective analysis of statistical data and criminal intelligence while community policing emphasizes responding to priorities identified by the community. Minor quality of life violations that the community favors prioritizing may not receive the same level of enforcement and attention under intelligence-led policing. If the community is not the dominant source of police policy, it could create a separation between the police and the community.

Intelligence-led policing can lead to civil liberties concerns, if there are not proper safeguards on what information is being collected and stored by police. Local police agencies do not have a good history of respecting the constitutional rights of citizens when it comes to intelligence gathering activities. The “Red Squads” of the 1950s and 1960s were originally formed as local police intelligence units to gather information on suspected communists.<sup>82</sup> Their efforts shifted focus to anti-war protesters and civil rights groups in the late 1960s and early 1970s. After a number of violations of civil rights were identified by lawsuits and grand jury investigations across the nation, court injunctions were issued against many police agencies. These had a major impact on curtailing abuses and many local police agencies reduced police intelligence operations and eliminated the practice of creating “files” on individuals. Since 9/11 the renewed emphasis on local police intelligence operations has begun to increase concern by civil

---

<sup>81</sup> International Association of Chiefs of Police, *Criminal Intelligence Sharing: A National Plan for Intelligence-Led Policing at the Local, State and Federal Levels* Washington, DC: United States Department of Justice, Office of Community Oriented Policing, August 2002), 5.

libertarians that past abuses will be repeated. A recent *U.S. News and World Report* investigation identified nearly a dozen questionable instances where local police intelligence units conducted surveillance or infiltration, or made arrests of anti-war protesters, union activists, or library patrons surfing the web.<sup>83</sup> The *New York Times* has revealed that the New York City Police Department's RNC Intelligence Squad conducted extensive surveillance and created hundreds of files on individuals who had no apparent intention of breaking the law as they prepared for the 2004 Republican National Convention.<sup>84</sup>

Intel-led policing could also raise future concerns of an over-reliance on police deployment decisions being made on the basis of information provided by criminal informants. These concerns about intelligence-led policing could best be addressed by combining the new intelligence-led policing paradigm with the community philosophy rather than creating a separate model.

#### **F. NEW POLICE ROLE: COUNTERTERRORISM**

Police departments across the United States began to greatly increase intelligence collection efforts following the 9/11 attacks. It was quickly realized that not only was collection needed, but all of the other steps of the intelligence process cycle – analysis, planning, processing, dissemination, and re-evaluation – were needed. The priority placed on intelligence resulted in a resurgence of the police intelligence function.

A view shared by many police officials is that increasing counterterrorism responsibilities will require shifting resources away from community policing. However, community policing can be an integral part of a counterterrorism strategy. In Britain, this fact has been recognized for many years; the prevention of terrorism is one of the four fundamental goals of their community policing program and is the overarching theme of

---

<sup>82</sup> David E. Kaplan, "When the Cops Only Saw Red," *U.S. News and World Report*, May 8, 2006.

<sup>83</sup> David E. Kaplan, "Spies Among Us: Despite Troubled History, Police Across the Nation are Keeping Tabs on Ordinary Americans," *U.S. News and World Report*, April 30, 2006.

<sup>84</sup> Jim Dwyer, "NYC Police Spied on Ralliers Before GOP Convention," *New York Times*, March 25, 2007.

their *National Policing Plan*.<sup>85</sup> In the UK, community policing is seen as the primary means to establish connections to the often isolated Muslim community. The goals are not only to obtain intelligence but to share information with the community, recruit Muslims to join the police service, and establish close interactive connections with members of the community to ease social tensions.

In the United States, police officials are beginning to realize the potential of community policing as an anti-terrorism tool. Community policing officers have shown that they are experts at collecting information on criminal activity such as drug dealing and gang activity from neighborhood residents who have learned to trust their community policing officers. These officers can be trained to recognize information that is of intelligence value for counter-terrorism and can educate the community on signs of potential terrorist activity. Besides collecting information, they can also reduce the public's unwarranted fear of terrorism by sharing information on the realities of terrorist threats. Community policing officers were used successfully following 9/11 to deal with fear and rumor management concerning neighborhood mosques and possible retaliation against innocent Muslim Americans.

Intelligence-led policing may even be the key to greater use of the community policing philosophy to fight terrorism. Intelligence-led policing can help to integrate community policing and law enforcement intelligence. The greatest amount of intelligence of value will come from the strong community relationships that community policing creates. As the UK discovered following the London Subway Bombings of 7/7, "homegrown" terrorists who have been radicalized by Islamic extremists may be the greatest threat on the horizon. In the U.S., this phenomenon may be on the rise also. The recent arrest of a New Hampshire man who converted to Islam and allegedly participated in terrorist activities in Somalia shows how radicalization could also pose a future problem for the United States.<sup>86</sup>

---

<sup>85</sup> City of London Police Authority, *Local Policing Plan 2005-2008*, (London, July 2004),10.

<sup>86</sup> Charles A. Radin, "From N.H. to Somalia: Recalling a Suspect's Zeal," *Boston Globe*, February 17, 2007.

In the wake of the attacks on the London subway system, British authorities developed a new model of counter-terrorism. A revised Terrorism Act was passed by Parliament in April 2006 which amended and expanded previous anti-terrorism legislation. It made “glorification of terrorism,” “dissemination of terrorist publications,” and “training for terrorism” criminal offenses and expanded police powers to detain terrorist suspects for up to twenty-eight days.<sup>87</sup> The plan also emphasized that the primary strategy of the police would be to emphasize community policing principles in Muslim neighborhoods and form partnerships with Muslim groups. Sir Ian Blair, the chief of the Metropolitan Police, has described the goals of the effort to use community policing principles to facilitate information sharing, build trust in the community for police operations and arrests, and mitigate the negative impact of enforcement efforts within the Muslim community.<sup>88</sup>

## **G. REGIONAL INTELLIGENCE CENTERS**

One of the most significant post 9/11 developments for state and local police agencies was the creation of state and regional fusion centers or intelligence centers. These centers were not mandated by the Department of Homeland Security but have been quickly adopted by DHS and recognized as a key element of a new national intelligence network. There are currently thirty-eight intelligence centers operating in the states and major Urban Area Security Initiative (UASI) regions.<sup>89</sup> Los Angeles recently opened the Joint Regional Intelligence Center (JRIC) in Norwalk, California. The center houses federal, state, and local police in one facility to improve intelligence sharing and anti-terror collaboration. There are many variations of these intelligence centers; some focus strictly on counterterrorism while others pursue an “all crimes, all hazards” approach. The Department of Justice and the Department of Homeland Security have published a set of *Fusion Center Guidelines* to assist in the establishment, development, and

---

<sup>87</sup> British Home Office, “Terrorism Bill,” Parliamentary Bill 55 (April 2006).

<sup>88</sup> Jyette Klausen, “British Counter-Terrorism After the July 2005 Attacks: Adapting Community Policing to the Fight Against Domestic Terrorism,” United States Institute of Peace, <http://www.usip.org/pubs>, [Accessed February 27, 2007].

<sup>89</sup> Mary Beth Sheridan and Spencer S. Hsu, “Localities Operate Intelligence Centers to Pool Terror Data,” *Washington Post*, December 31, 2006.

operation of these centers. The guidelines define a fusion center as a “collaborative effort of two or more agencies that provide resources, expertise and/or information to the center with the goal of maximizing the ability to detect, prevent, investigate and respond to criminal and terrorist activity.”<sup>90</sup>

These regional intelligence centers have the capability to “fuse” various databases from law enforcement along with information from nontraditional collectors of intelligence such as private sector organizations (risk assessments and suspicious activity reports, etc.) and non-law enforcement public safety organizations into meaningful intelligence.<sup>91</sup> Regional intelligence centers will be the key for incorporating the private sector into a coordinated homeland security strategy. The intelligence centers will serve as the analytical hub for collecting, processing, and disseminating information to consumers both horizontally and vertically. Regional intelligence centers have the ability to break down traditional barriers to information sharing and develop intelligence led policing into the new version of community policing for the twenty first century.

## **H. COMMUNITY BASED COUNTERTERRORISM STRATEGY**

In the United States, there is growing recognition of the important role that community policing can play in preventing terrorism but the strategy has not been adopted as part of a national counter-terrorism strategy. Community policing can be used not only for intelligence gathering and information sharing but to address future possible Islamic radicalization of Muslim youth. The police have adapted to new roles in the past and have been shown to be natural problem solvers. While rising crime rates will continue to task police resources, re-defining community policing initiatives as counter-terrorism activities will not add significant costs to police operations.

The community policing philosophy has been expanded in the UK to include public and private partnerships along with community partnerships to fight terrorism. In

---

<sup>90</sup> United States Department of Justice, *Fusion Center Guidelines, Developing and Sharing Information and Intelligence in a New Era* (Washington, DC: Global Justice Information Sharing Initiative, July 2005), 8.

<sup>91</sup> *Ibid*, 4.



Britain, the Home Office recently urged police to work with university authorities to prevent Muslim students from getting involved with radical religious groups. Several top universities have been penetrated by radical Islamic groups. As part of their partnership, Scotland Yard officials toured some of the universities which have nuclear research laboratories and made recommendations on increasing security to prevent theft of radioactive material.<sup>92</sup> These types of public-private partnerships can also be capitalized on in the United States where 85 percent of critical infrastructure and key resources are privately owned. Although not traditionally thought of as communities, the educational, medical, and industrial laboratories where radiological materials are stored could benefit from law enforcement expanding traditional community partnerships.

In America, we've taken a decidedly different approach than the European democracies in militarizing our counter-terrorism strategy. We are fighting a "war on terror" but our front line troops domestically are our local law enforcement officers. I recommend a strategy which focuses on using community policing as the basis for our counter-terrorism strategy. Human intelligence gathering, data sharing, interagency and interdisciplinary partnerships, the coordinated deployment of resources, and developing close working relationships with the community will be enhanced. Intelligence-led policing will focus law enforcement efforts on preventive, proactive strategies as opposed to the reactive, traditional after-the-fact investigative approaches of the past. New partnerships with private security at the local police level can serve to increase security for dangerous radioactive material and these partnerships can increase local police intelligence capabilities. Ultimately our national security may rely on strengthening our neighborhood security.

---

<sup>92</sup> Anonymous, "Anti-Terror Cops Inspect Nuclear University," *UK News*, December 27, 2006 [www.lse.co.uk](http://www.lse.co.uk), [Accessed February 21, 2007].

Table 2. Three Historical Era's of Law Enforcement Evolution [From Kelling and Moore]<sup>93</sup>

	<b>Political Era</b>	<b>Reform Era</b>	<b>Community Era</b>
<b>Authorization</b>	Political	Law and professionalism	Community support, law professionalism, political
<b>Function</b>	Crime control, order maintenance, broad social services	Crime control	Crime control, crime prevention, problem solving
<b>Organizational Design</b>	Decentralized and geographical	Centralized, classical	Decentralized, task force matrices
<b>Relationship to Environment</b>	Close and personal	Professionally remote	Consultative, defend law and professionalism, but listen to community concerns
<b>Demand</b>	Managed through links between politicians and precinct commanders and face-to-face contact with citizens	Channeled through central dispatching	Channeled through analysis of underlying problems
<b>Tactical and Technology</b>	Foot patrol and rudimentary investigations	Preventive patrol and rapid response to calls for service	Foot patrol, problem solving
<b>Outcome</b>	Political and citizen satisfaction with social order	Crime control	Quality of life and citizen satisfaction

<sup>93</sup> George L. Kelling and Mark H. Moore, "The Evolving Strategy of Policing," *Perspectives on Policing*, (Washington, D.C.: National Institute of Justice, 1988). Matrix created from material.

## IV. SECURITY OF SOURCES

In the United States, the Nuclear Regulatory Commission oversees the safety and security of nuclear reactors and licenses ownership of radioactive sources. There are two types of licenses which govern the more than two million radioactive sources in the United States: General and Specific. General licenses apply to the less hazardous sources. Approximately 135,000 companies are general licensees and these account for approximately 1.8 million low level radioactive sources.<sup>94</sup> These sources do not pose a high security concern. Specific licenses are issued to provide stricter controls over the more hazardous radioactive sources that are used in medicine, research, and industry. There are a little over 20,000 specific licenses.<sup>95</sup>

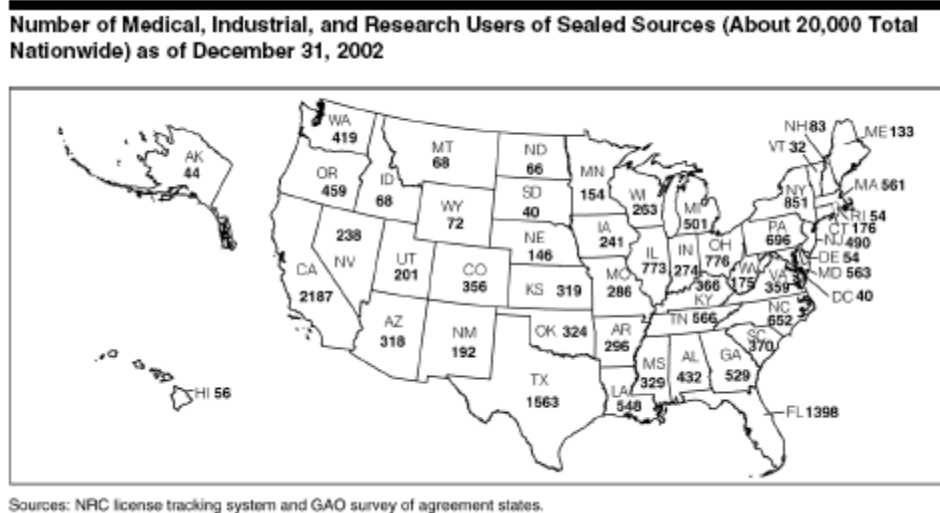


Figure 1. NRC Sealed Sources Licensees [From GAO-03-804]<sup>96</sup>.

<sup>94</sup> Charles D. Ferguson, Tahseen Kazi, and Judith Perera, "Commercial Radioactive Sources: Surveying the Security Risks," Monterey Institute of International Studies, Center for NonProliferation Studies, Occasional Paper No. 11, January 2003.

<sup>95</sup> Ibid, 46.

<sup>96</sup> United States Government Accountability Office, 2.

Within this group of specific licenses, a smaller subset of sources containing amounts the Nuclear Regulatory Commission describes as being of increased concern pose a true security risk. These specific sources could be used to create a RDD or dirty bomb. The NRC and the Department of Energy have formed a materials security working group to categorize sealed sources by their level of risk.<sup>97</sup> The NRC and the agreement states have also formed a working group that has identified approximately 2,100 licensees to be in the greatest risk group based on the type and quantity of material.

The 9/11 attacks on America resulted in an across-the-board reassessment of our nation's security. The continuing terrorist threat to America prompted the NRC to revisit the existing controls for radioactive materials. The NRC communicates directives to its licensees primarily through two means: Advisories and Orders. Advisories are non-public rapidly disseminated information bulletins from the intelligence community or law enforcement agencies on the threat environment and guidance to strengthen their capabilities against the threat.<sup>98</sup> Orders are regulatory requirements that modify, revoke, or suspend licenses or require specific actions by the licensee.<sup>99</sup> Following the 9/11 attacks, the NRC issued new increased controls for radioactive materials that, for the first time, designate a role for local law enforcement in the security of radiological materials.

Effective June 2, 2006, licensees with radioactive material of quantities of concern would be subject to increased controls. The United States Nuclear Regulatory Commission issued an order for increased controls for radioactive sources "to reduce the risk of unauthorized use of radioactive materials, through access controls to aid prevention, and prompt detection, assessment and response to mitigate potentially high consequences that would be detrimental to public health and safety."<sup>100</sup>

The increased controls from the NRC for the first time recognize the role of local law enforcement agencies in radioactive materials security. The requirements are for

---

<sup>97</sup> GAO-03-804, 17.

<sup>98</sup> "Advisories and Orders," <http://www.nrc.gov/security/faq-911.html>, [Accessed March 14, 2007].

<sup>99</sup> Ibid.

<sup>100</sup> United States Nuclear Regulatory Commission, "Order Imposing Increasing Controls," Docket EA 05-090, November 14, 2005.

licensees who possess sufficient quantities of concerns (see chart) “to respond immediately to any actual or attempted theft, sabotage or diversion of such radioactive material or devices.”<sup>101</sup> The response requires the licensee to request assistance from the local law enforcement agency (LLEA).

The increased controls also require the licensee “to have a pre-arranged plan with LLEA for assistance in response to an actual or attempted theft, sabotage or diversion of such radioactive materials or devices. The complexity of the plan must be consistent in scope and timing with a realistic potential vulnerability of the sources containing such material.”<sup>102</sup> The NRC controls require the radioactive material licensees to collaborate with local law enforcement on their response plans. The plans have to be documented and must be based on realistic risk assessments. The material describing licensee-specific measures to meet these orders is considered Sensitive Unclassified Non-Safeguards Information (SUNSI) and is to be withheld from public disclosure.<sup>103</sup>

The NRC’s regulatory scheme is portrayed in Figure 1. The NRC delegates its authority to regulate quantities of radioactive materials to states under the Agreement States Program under the Atomic Energy Act of 1954.<sup>104</sup> Today, thirty-four states, or approximately 75 percent of the states, have entered into agreements with the governor and chairman of the NRC accepting regulatory responsibility from the NRC. In the remaining states, the NRC directly regulates licensees that possess radioactive materials.

---

<sup>101</sup> United States Nuclear Regulatory Commission, “Order Imposing Increasing Controls,” Docket EA 05-090, November 14, 2005.

<sup>102</sup> Ibid.

<sup>103</sup> Massachusetts Department of Public Health Radiation Control Program, Inspection Enforcement and Security Branch, “Increased Controls,” Law Enforcement Presentation and Handouts, March 30, 2006.

<sup>104</sup> Atomic Energy Act of 1954, Section 274b.

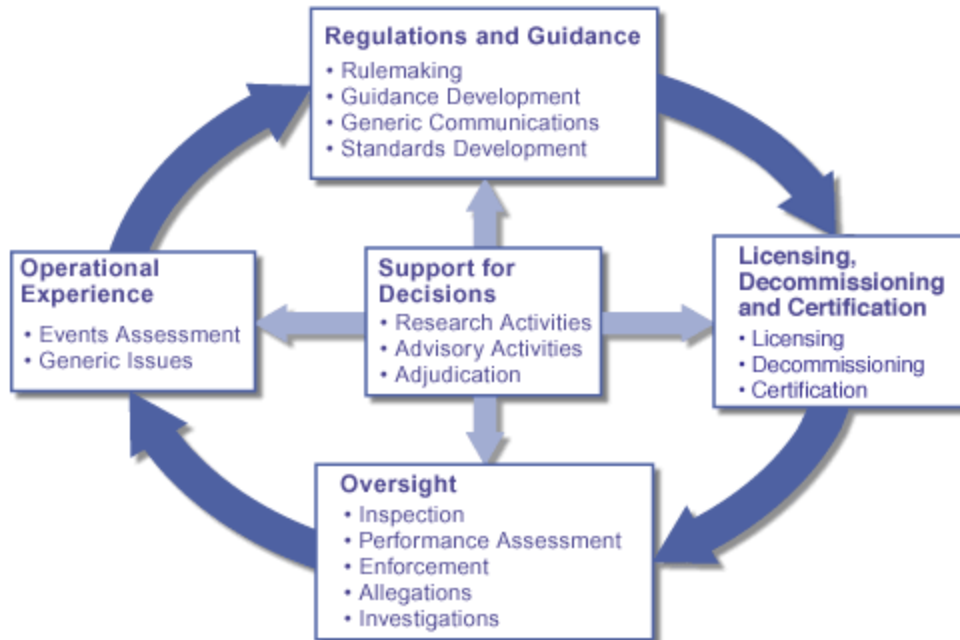


Figure 2. How the NRC Regulates [From the U.S. NRC]<sup>105</sup>

This diagram gives an overview of NRC's regulatory process which has five main components: (1) developing regulations and guidance for our applicants and licensees, (2) licensing or certifying applicants to use nuclear materials or operate nuclear facilities or decommissioning that permits license termination, (3) overseeing licensee operations and facilities to ensure that licensees comply with safety requirements, (4) evaluating operational experience at licensed facilities or involving licensed activities, and (5) conducting research, holding hearings to address the concerns of parties affected by agency decisions, and obtaining independent reviews to support our regulatory decisions.<sup>106</sup>

## A. ORPHANED SOURCES

Radioactive sources that are not under institutional controls because of being lost, stolen, or abandoned are called orphaned sources.<sup>107</sup> Every year approximately 250

<sup>105</sup> "How the NRC Regulates," [www.nrc.gov](http://www.nrc.gov) [Accessed June 9, 2007]

<sup>106</sup> Atomic Energy Act of 1954, Section 274b.

<sup>107</sup> Ferguson, et al, "Commercial Radioactive Sources."

radioactive sources are reported to be stolen, lost, or abandoned in the United States.<sup>108</sup> Within the last ten years the Nuclear Regulatory Commission reports that companies have lost track of more than 1,500 radioactive sources in the United States and more than half (56 percent) were never recovered.<sup>109</sup> The director of the Domestic Nuclear Detection Office of the Department of Homeland Security reports that incidents being reported to United States intelligence officials of material being stolen, offered for sale, or lost has more than doubled since the 1990s.<sup>110</sup>

The problem exists not only in the United States but worldwide, particularly in the former Soviet Union. The Director General of the International Atomic Energy Agency recently urged the world to step up efforts to protect nuclear material from falling into terrorists' hands and revealed that his agency has recorded more than 650 attempts to smuggle radiological material in the last ten years.<sup>111</sup> Efforts are being made both nationally and internationally to increase the tracking and security of source materials from the "cradle to the grave."<sup>112</sup> Table 3 from the International Atomic Energy Association shows incidents of weapons-usable material reported to be missing or suspected of being stolen. Ferguson, Kazi, and Perera have argued in a recent study, "Commercial Radioactive Sources: Surveying the Security Risks," that security efforts need to be focused on the smaller subset of highly radioactive materials that are not kept in secure settings and pose a true danger to be used in RDD's by terrorists.<sup>113</sup>

---

<sup>108</sup> United States General Accounting Office, "Nuclear Security: Federal and State Action Needed to Improve Security of Radioactive Sources," GAO-03-804, August 2003, 6.

<sup>109</sup> International Atomic Energy Agency, "Inadequate Control of World's Radioactive Sources," June 24, 2002, [www.iaea.org/newscenter/pressreleases/2002/prn/0209.shtml](http://www.iaea.org/newscenter/pressreleases/2002/prn/0209.shtml), [Accessed June 11, 2007].

<sup>110</sup> Richard Willing, "Nuclear Traffic Doubles Since '90's," *USA Today*, December 25, 2005.

<sup>111</sup> Thomas Wagner, "ElBaradei: Protect Nuclear Material," Associated Press, December 6<sup>th</sup>, 2006, <http://www.iiss.org/index.asp>, [Accessed June 4, 2007].

<sup>112</sup> International Atomic Energy Agency.

<sup>113</sup> Ferguson, et al, "Commercial Radioactive Sources," 24.

Table 3. Confirmed Incidents with Nuclear Material, 1993-2001 [From IAEA]<sup>114</sup>

Year	Weapons Usable Material	Other Nuclear Material	Total
1993	1	32	33
1994	6	40	46
1995	3	21	24
1996	0	16	16
1997	0	15	15
1998	0	11	11
1999	2	10	12
2000	3	10	13
2001	3	13	16
Total	18	168	186

## B. DOMESTIC NUCLEAR DETECTION OFFICE

The president directed the establishment of the Domestic Nuclear Detection Office in April 2005, in *National Security Presidential Directive 43 / Homeland Security Directive 14*, to coordinate the national effort to protect the United States from nuclear and radiological threats. The office of domestic nuclear detection is located within the Department of Homeland Security (DHS) and the DNDO director reports to the Secretary of Homeland Security. The mission of the office is to address a broad range of radiological and nuclear protective measures primarily centered around the acquisition and support to deployment of a domestic nuclear detection system. The office is staffed with representatives from various federal agencies and state and local governments. One of the missions of the office is to encourage the enhancement of effective sharing of information and the use of nuclear detection information and intelligence.<sup>115</sup>

<sup>114</sup> Christine Kucia, "Conference Pledges to Curb Dirty Bomb Danger," *Arms Control Today*, April 2003, 33.

<sup>115</sup> Office of the White House, Department of Homeland Security, "Domestic Nuclear Detection Office Fact Sheet", <http://www.fas.org/irp/offdocs/nspd/nspd-43fs.html>, [Accessed June 11, 2007].



### C. DEPARTMENT OF ENERGY

The United States Department of Energy (DOE) is another federal agency that is actively involved in the security of nuclear materials. The DOE protects the nation's nuclear facilities, weapons, and materials owned or operated by the DOE and directs intelligence and counter-intelligence against threats including terrorism. The Department of Energy, through its National Nuclear Security Administration (NNSA), is an integral part of the United States' efforts to reduce global danger from radiological and nuclear material through the Global Threat Reduction Initiative.<sup>116</sup> In addition to international efforts, the NNSA runs a domestic source recovery program through the Los Alamos National Laboratory to remove and securely manage radioactive materials that could be at risk for theft or diversion for use in a radiological dispersal device.

The NNSA actively pursues materials that pose a national security risk. Recently, in Plymouth, Massachusetts, after concerns were raised by Massachusetts Health officials concerning a business that failed to properly secure a quantity of cesium-137, the NNSA removed the material which they said could have been used to make a radiological dispersal device. NNSA officials announced that, to date, "the program has recovered more than 13,000 sources, enough material to make more than 1,400 potent dirty bombs – from over 500 facilities."<sup>117</sup>

The Environmental Protection Agency (EPA) is another federal agency that has a program to secure orphaned sources in the United States. The EPA's Orphaned Source Initiative was the first national program devoted to the control of these sources. The EPA initiative works to identify, secure, and remove materials at municipal waste management sites, steel mills, and scrap yards.<sup>118</sup>

---

<sup>116</sup> United States Department of Energy Web Site, <http://www.energy.gov/nationalsecurity/wmd.htm>, [Accessed June 13, 2007].

<sup>117</sup> Anonymous, "Feds Remove Cesium from New England Site," *United Press International*, December 29, 2007.

<sup>118</sup> Environmental Protection Agency, "Orphaned Source Initiative," <http://www.epa.gov/radiation/cleanmetals/orphan.htm>, [Accessed June 13, 2007].

#### D. FACILITY SECURITY

The security of facilities containing sealed sources has been questioned by both CRS and GAO investigative reports. The security of these sources typically contained in medical or research facilities have been found to vary widely, from extensive security measures to unlocked and unguarded.<sup>119</sup> Private security is responsible for protecting this material. The private security industry has been beset by low pay, low or no standards, and little or no training.<sup>120</sup> Physical security of radiological materials at hospitals has been identified by the GAO as particularly troublesome.<sup>121</sup> A recent special report in *Jane's Security and Terrorism Monitor* describes the enforcement of United States laws and regulations surrounding the storage, sale and shipment of radiological source material as "notoriously lax."<sup>122</sup>

Even at university sites where there are nuclear reactors, the security of facilities has been questioned. The ABC *Primetime* television news show recently aired an expose on security at the twenty-five nuclear research reactors on college campuses across the country. Two ABC interns, posing as visiting students, were allowed to tour and video the nuclear reactor at Kansas State University, despite university regulations requiring background checks and no cameras. The women reported that they had free reign of the reactor and that there were no guards or metal detectors present; a closed circuit TV system appeared to be the only security measure in place.<sup>123</sup>

While the NRC issued its first security advisory order to the nation's seventy large irradiator facilities following 9/11, these industrial facilities typically have thick concrete walls and interlocking doors for radiation security in addition to extensive

---

<sup>119</sup> Environmental Protection Agency, "Orphaned Source Initiative," <http://www.epa.gov/radiation/cleanmetals/orphan.htm>, [Accessed June 13, 2007], 5.

<sup>120</sup> Larry Margasak, "Security Industry Called Beset by Low Pay, Training," *Boston Globe*, June 3, 2007.

<sup>121</sup> Andrew J. Grotto, *Defusing the Threat of Radiological Weapons: Integrating Prevention with Detection and Response* (Washington, DC: Center for American Progress, July 2005), 4.

<sup>122</sup> Jane's Information Group, "Radioactive Material and Terrorism," *Jane's Terrorism and Security Monitor*, February 16, 2005.

<sup>123</sup> Kristen Broderick, "ABC Studies Kansas State University, 24 Other Schools Nuclear Reactors," *Kansas State Collegian*, October 14, 2005.

security alarms. Other sealed source users in less secure settings pose a greater risk of theft. The licensing and inspection system of these sources has been criticized as being susceptible to fraud.<sup>124</sup> Certain radioactive isotopes such as cobalt-60, cesium-137, iridium-192 and americium-241 pose a greater risk since they have properties which make them attractive to use by terrorists in a dirty bomb. Table 4 shows the radionuclides of concern from the NRC.

Table 4. Values [From the NRC]<sup>125</sup>

<b>Table 4: Radionuclides of Concern</b>		
Radionuclide	Quantity of Concern (TBq)	Quantity of Concern (Ci)
Am-241	0.6	16
Am-241/Be	0.6	16
Cf-252	0.2	5.4
Cm-244	0.5	14
Co-60	0.3	8.1
Cs-137	1	27
Gd-153	10	270
Ir-192	0.8	22
Pm-147	400	11,000
Pu-238	0.6	16
Pu-239/Be	0.6	16
Se-75	2	54
Sr-90 (Y-90)	10	270
Tm-170	200	5,400
Yb-169	3	81

In 2003, The Los Alamos National Laboratory conducted a study on reducing the potential use of radiological source materials in radiation dispersal devices. The study recommends focusing on the large and potentially hazardous radiological source materials as a means to reduce the RDD threat. Using open source and International Atomic Energy Association databases the lab examined the entire life cycle of material:

---

<sup>124</sup> Charles D. Ferguson and Joel O. Lubenau, "Securing U.S. Radioactive Sources," *Issues in Science and Technology* 20, no. 1 (Fall 2003).

<sup>125</sup> Massachusetts Department of Public Health, Radiation Control Program, "Increased Controls."

production, sales, transportation, users, disposition (including orphaned sources), waste consolidation sites, and waste disposal sites.<sup>126</sup> By cross-comparing the vulnerabilities associated with large radiological source applications at various points in the life cycle, the authors created a Source Status Concern Index (SSCI) that represented data on the radioactivity, hazard factor, accessibility, and security factor. Based on this analysis, the highest risk reduction priorities were identified. Transportation of cobalt-60 sources and teletherapy source user facilities (hospital cancer treatment centers) were at the top of the vulnerability list.<sup>127</sup>

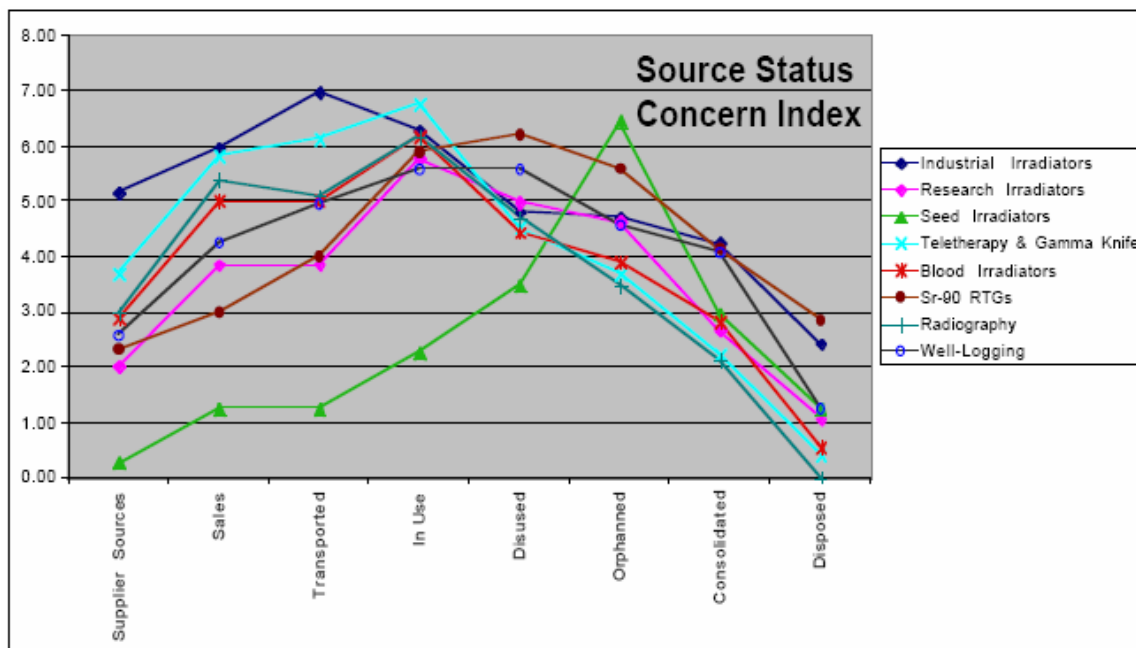


Figure 3. Source Status Concern Index [From Los Alamos National Lab]<sup>128</sup>

There is disagreement between the agreement states and the NRC on the appropriate role of the states in regulating sealed sources. A GAO study found that 82 percent of the states indicated they want to have responsibility for inspection and

<sup>126</sup> Gregory J. Van Tuyle, Tiffany L. Strub, Harold A. O'Brien, Caroline F. V. Mason, and Steven J. Gitomer, *Reducing RDD Concerns Related to Large Radiological Source Applications*, LA-UR-03-6664 (New Mexico: Los Alamos National Laboratory, September 2003), 2.

<sup>127</sup> Ibid., 4.

<sup>128</sup> Ibid., 3.

enforcement of security measures for sealed sources.<sup>129</sup> The NRC and many of the agreement states do not carry out inspections before specific licenses are granted and wait for as much as a year after licenses are granted to inspect facilities. Another problem that has been identified by the GAO is that many agreement states lack adequate measures for enforcing existing standards and many were unable to identify the number of sources within their jurisdictions.<sup>130</sup> The NRC has issued orders to increase security of sealed sources of quantities of concerns. These security orders are not public information. The orders instructed licensees to:

- 1) Install additional physical barriers.
- 2) Enhance coordination with law enforcement.
- 3) Create more restrictive site access controls.<sup>131</sup>

The 9/11 Commission report highlighted four kinds of failures in decreasing the risk of terrorism: imagination, policy, capabilities, and management.<sup>132</sup> Local police departments have played a very limited role in the past in radiological security, responding only after thefts or incidents have already occurred. This research suggests a need to create new collaborative partnerships with our private partners in the radiation industry, government regulators, and our local public safety community in order to protect our country from potential terrorist uses of radiological material and to develop and share intelligence on preventing terrorists from acquiring this material. The controls which are mandated for the licensees, and not the local law enforcement agencies, create an opportunity to create a new network for radiation security in cities. This strategy proposes utilizing law enforcement's community policing foundation to develop a public/private collaboration focused on radiation security.

---

<sup>129</sup> GAO-03-804, 6.

<sup>130</sup> Government Accountability Office (GAO), *U.S. and International Efforts to Control Sealed Radioactive Sources Need Strengthening*, GAO-03-638 (Washington, DC: GAO, August 2003), 9.

<sup>131</sup> Massachusetts Department of Public Health, Radiation Control Program, "Increased Controls."

<sup>132</sup> Thomas H. Kean, Chair, *The 9/11 Commission Report, Final Report of the National Commission on Terrorist Attacks Upon the United States* (New York: Norton and Company, July 2004), 339.

THIS PAGE INTENTIONALLY LEFT BLANK

## **V. POLICY ANALYSIS AND IMPLEMENTATION**

### **A. POLICE ROLE IN RADIOLOGICAL SECURITY**

Local police agencies since 9/11 have taken on new roles in anti-terrorism and critical infrastructure protection without increases in staffing. In fact, many police agencies have fewer officers than they did on 9/11.<sup>133</sup> These officers have had to deal with an increase in violent crime in major cities across the United States.<sup>134</sup> The Boston Police Department, through attrition, has 300 fewer officers now than in 2001, primarily due to budget issues and reduced federal grants. The New York City Police Department shrunk from a high of 40,078 officers in 2000 to 36,284 uniformed officers as of June 2007.<sup>135</sup> This research has identified the problem of lax security for radiological isotopes which could be used to construct an RDD. Local police agencies have not traditionally been involved with the security of radioactive sources.

How can police agencies deal with new homeland security responsibilities with fewer officers? One way is to expand through collaboration with private security. There are approximately 600,000 police officers in America but there are over 1.5 million private security officers. Tapping into this network can expand not only security but intelligence gathering efforts. Our first line of defense as a nation is intelligence. Our past community policing efforts were built on partnerships. By creating partnerships with the private security who are guarding radioactive materials, we can influence protective measures and gather and share intelligence. What would a proposed strategy look like?

---

<sup>133</sup> National Institute of Justice, "Hiring and Keeping Police Officers," *NIJ Research for Practice*, July 2004, NCJ 202289, 2.

<sup>134</sup> Randall Pinkston, "FBI: Violent Crime on the Rise," *CBS NEWS*, June 2, 2007, <http://www.cbsnews.com/stories/2007/06/02/eveningnews/printable2878844.shtml>, [Accessed June 4, 2007].

<sup>135</sup> The City of New York, Independent Budget Office, "Testimony of Preston Niblack Deputy Director Before the City Council Public Safety Committee on NYPD Uniformed Hiring and Retention," June 4, 2007. <http://www.ibo.nyc.ny.us/iboreports/NYPDatrit.pdf>, [Accessed July 9, 2007].

## **B. POLICY OPTIONS ANALYSIS**

There are three primary options for a new local law enforcement role in radiological security.

### **1. Option A**

The first option is to maintain the status quo. Local police departments should not take on additional homeland security responsibilities. Violent crime is up in major cities across the nation. Staffing levels have decreased in major cities across the United States since 9/11. Police resources are being diverted from crime fighting to homeland security, while federal assistance to police forces has been greatly reduced. The licensee is responsible for the security of radioactive material and only after the theft or attempted theft of material should police become involved. The new NRC requirements for licensees to collaborate with local law enforcement on security are binding on the licensee and not the law enforcement agency.

### **2. Option B**

The police department recognizes the danger of these materials and seeks to hold security to tighter standards through regulation. The police can seek additional regulatory authority directly over source material through changes in state law or municipal ordinance. Many agreement states have indicated through surveys that they lack sufficient personnel to properly enforce licensee compliance with security standards through inspections. In order for Option B to be properly implemented, police staffing levels would need to be increased.

### **3. Option C**

The police department uses this as an opportunity to increase radioactive material security in the city. Recognizing that these materials are present in large quantities and could pose a significant danger if acquired by terrorists, the department – rather than simply receiving plans – coordinates and collaborates with facility security to ensure the material is secured properly and law enforcement responds appropriately. The goal



would be to develop a partnership with the private security personnel who physically manage security at these facilities. The police department would use the community policing approach to building a radiological security network.

Table 5. Policy Options Analysis Matrix [Adapted from Bardach]

<b>Policy Alternative</b>	<b>Cost</b>	<b>Sustainability</b>	<b>Security</b>	<b>Partnerships</b>	<b>Legislation</b>
<b>Option A Status Quo</b>	<b>No</b>	<b>High</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>Option B Regulatory</b>	<b>High</b>	<b>Low</b>	<b>Med.</b>	<b>Low</b>	<b>High</b>
<b>Option C Community Policing</b>	<b>Low</b>	<b>High</b>	<b>High</b>	<b>High</b>	<b>No</b>

The Policy Options Analysis Matrix is an analytical tool for comparison of alternative policies based on evaluative criteria of projected outcomes.<sup>136</sup> Each alternative is assigned a weighted measure from “no” perceived effect on the criteria to “high” effect based on a construct of an outcome analysis of the proposed alternatives. The grid allows for a concise distillation of broad policy concepts by applying criteria to evaluate options based on projected outcomes. For example, Policy Option A is to continue the present course. There would be no additional costs to the agency, the present trend could continue without alterations, so it would rate as highly sustainable,

---

<sup>136</sup> Eugene Bardach, *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*, 2<sup>nd</sup> ed. (Washington, DC: CQ Press, 2005), 46.

there would be no increase or decrease in present radiological security, no new partnerships would be created, and no legislation would be required to effect the policy change.

### **C. POLICY RECOMMENDATION**

Option A is essentially to maintain the status quo. It would be the preferred option if it is believed that radiological attack is not a valid threat or that protection of radioactive materials is not a local police function. This option would incur no additional costs. However, this paper has demonstrated that terrorist use of radiological materials is a legitimate risk to public safety.

Option B has the police become a formal part of the nuclear regulatory scheme. State law or municipal ordinance would have to be enacted to empower police with this responsibility. A concern in the implementation of strategy option B is the increased regulatory duties of police officers. Few people outside of policing realize how many regulatory duties, not directly associated with policing, officers have. Practices vary regionally but older police agencies, especially in the Northeast, have a great many regulatory functions that they have inherited over the years. An example in the Boston Police Department is the Hackney Carriage Division, which regulates the taxi industry. The police department has regulated the hiring of carriages for rides since horse drawn carriages began offering rides for money in the late 1800s. The modern Boston taxi industry, with over 1,000 cabs, is entirely regulated by the police department, from the testing and licensing of drivers, to the inspection of cabs and the selling of taxi medallions.

Police officers are also agents of the State Alcohol Control Board and enforce and inspect for violations in the city's bars and restaurants. They also serve as agents for the city's various licensing boards, inspecting and enforcing ordinances relating to certificates to sell milk in stores, etc. Regulatory duties have been found to be relatively easy to acquire but impossible to shed. The radiation industry would obviously object to any increase in regulatory oversight. The goal is to increase the security of materials, not to have police replace or become industry regulators. Once such a role is accepted by the

police, there is a danger of them being used in compliance and enforcement efforts as legislators attempt to try to increase controls.<sup>137</sup> Since 9/11, the homeland security responsibilities of law enforcement personnel have grown substantially. Unfortunately, budgets have not and the hiring of officers has suffered. The City of Boston has approximately 300 hundred fewer officers than on 9/11 and the situation is similar in many jurisdictions.<sup>138</sup> Community policing efforts have suffered and crime is on the increase.

Option C uses the community policing model to increase radiation safety. Existing personnel are utilized. There would be some additional future training costs for the private security personnel and police officers in radiological security (costs that may be recoverable through homeland security grants). Establishing a collaborative relationship with our private security partners will have an added benefit for the Police Department in terms of developing and sharing intelligence. The intelligence officers could also provide critical information for target hardening and other aspects of the security plan. Intelligence can properly assess and quantify the threat, vulnerability, and consequence factors that security needs to develop a proper plan. The period when terrorists are conducting their pre-operational surveillance is the best opportunity for security to uncover and prevent the theft of material.

If laws enforcement personnel become industry regulators, the overall goal of developing partnerships may suffer, as the police would eventually be viewed as compliance officers rather than collaborators. Trust is a necessary component of partnership and undoubtedly it would suffer if the industry believed that police were trying to punish them for violations as opposed to working with them. Similarly, intelligence efforts are much more likely to be successful if they are based on developing partnerships as opposed to the police becoming overseers. Option C, the community policing approach to radiological security, is the policy recommended by this research. It

---

<sup>137</sup> Malcolm K. Sparrow, *The Regulatory Craft, Controlling Risks, Solving Problems and Managing Compliance* (Washington DC: Brooking Institute Press, 2000), 35.

<sup>138</sup> James Alan Fox, "Wall Needed Between Politics and Policing: President's Commitment to Constabulary is Cop-Out," *Boston Herald*, July 17, 2006, 23.

provides the most comprehensive approach and the most value in terms of operational effectiveness, cost effectiveness, and sustainability of the policy alternatives.

#### **D. THE FOUR ACTIONS FRAMEWORK: ELIMINATE, RAISE, REDUCE, AND CREATE GRID**

The four actions framework – eliminate, raise, reduce, and create – grid is another analytical tool from *Blue Ocean Strategy*. It forces an organization to focus on the value-cost trade-off created by raising and lowering factors needed to pursue strategic differentiation.<sup>139</sup> The grid is an easily understood method for managers to not only ask the four key questions on which factors are to be eliminated, raised, reduced, or created, but also to act on them.<sup>140</sup>

Table 6. Four Actions Framework Grid [From Kim and Mauborgne]

<b>ELIMINATE</b> <ul style="list-style-type: none"> <li>• Barriers to police and private security cooperation</li> <li>• Weaknesses in radiological security</li> </ul>	<b>REDUCE</b> <ul style="list-style-type: none"> <li>• Police reluctance to adopt new homeland security roles.</li> <li>• Police reliance on traditional after-the-fact 911 response and investigations</li> </ul>
<b>RAISE</b> <ul style="list-style-type: none"> <li>• Prevention efforts</li> <li>• Radiation security situational awareness</li> <li>• Overall material security</li> <li>• Private security capabilities</li> </ul>	<b>CREATE</b> <ul style="list-style-type: none"> <li>• New radiological security network</li> <li>• Intelligence sharing and collection opportunities</li> <li>• Public and private partnerships</li> <li>• Multi-disciplinary teams</li> </ul>

<sup>139</sup> Kim and Mauborgne, 35.

<sup>140</sup> Ibid.

## **E. STRENGTHS, WEAKNESSES, OPPORTUNITIES AND CHALLENGES**

A strengths, weaknesses, opportunities, and challenges (SWOC) analysis of a proposed strategy by an agency is a useful technique to identify the existing internal strengths and weaknesses that affect the proposed change and the external challenges and opportunities for the strategy to succeed in the future. The matrix reveals areas of potential problems such as organizational resistance to the proposed change within and outside the agency. Strong leadership will be needed to overcome the challenges but the outcome is greatly increased radiological security without a large expenditure of resources.

Table 7. S.W.O.C. Analysis

<b>INTERNAL</b>	<b>EXTERNAL</b>
<b>STRENGTHS</b>	<b>OPPORTUNITIES</b>
<ul style="list-style-type: none"><li>• Builds on existing successful community policing model.</li><li>• Sustainable</li><li>• Minimal costs to agency</li><li>• Increases security by focusing on prevention</li></ul>	<ul style="list-style-type: none"><li>• To develop new homeland security partnerships</li><li>• Radiation training can benefit both public and private partners</li><li>• Intelligence sharing and collection</li><li>• Creation of multi-disciplinary teams</li></ul>
<b>WEAKNESSES</b>	<b>CHALLENGES</b>
<ul style="list-style-type: none"><li>• Lack of regulatory authority to enforce security regulations</li><li>• Partnerships with private security may not be accepted because of traditional police organizational resistance to working with private security</li></ul>	<ul style="list-style-type: none"><li>• Difficult to maintain partnerships after the initial creation period.</li><li>• Possible resistance from some private agencies to join network due to fear of exposing security gaps.</li><li>• Lack of support without outside funding for private security training</li></ul>

## F. STRATEGY CANVAS

The strategy canvas is a diagnostic tool and analytic framework developed by W. Chan Kim and Renee Mauborgne in *Blue Ocean Strategy* to examine uncontested market space.<sup>141</sup> The model was developed for the private business sector but can also be used for analyzing strategic initiatives in the public sector. The model serves two purposes. First, it captures the current state of affairs in an industry, graphically showing where current industry invests or concentrates activity. Plotting across the factors of the industry on the horizontal axis allows us to map a strategic profile or value curve for the strategy. This shows areas where traditional policing does not invest or invests minimally and represents opportunity to create value innovation.

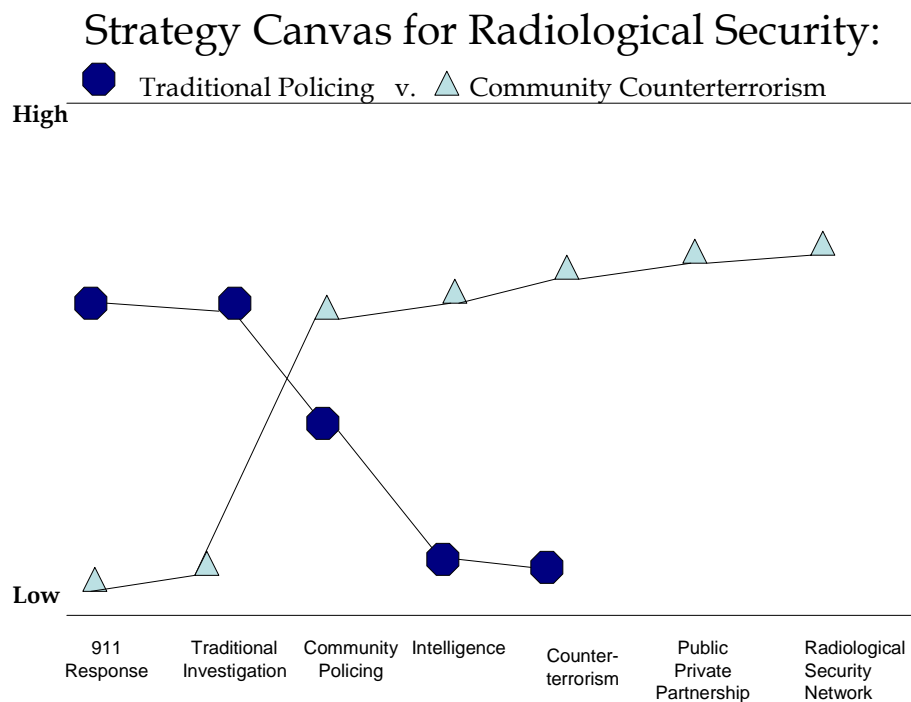


Figure 4. Strategy Canvas for Radiological Security [From Kim and Mauborgne]

<sup>141</sup> W. Chan Kim and Renee Mauborgne, *Blue Ocean Strategy* (Boston, MA: Harvard Business School Press, 2005), 25.

## **G. MODEL POLICY IMPLEMENTATION PLAN**

The police department can implement the policy using a similar model to that used in creating community policing programs. First, identify the stakeholders in the community. Then visit the neighborhood with them to identify problems and form partnerships to collaborate on solutions. The community was always identified as the first line of defense in community policing. Responsibility for neighborhood safety was theirs. They had to assume ownership. The community worked in collaboration with the police on neighborhood problems. The same paradigm can be used for the radiological security “community.” The police assist, but it is “their” neighborhood. A key element in this variation on the model is the involvement of the regional intelligence center for oversight and coordination.

- 1) **Identify Stakeholders:** The first step is to analyze the community of concern for radiological materials. It is important to consider the entire life cycle of radiological material as part of the identification process.
- 2) **Stakeholders Meeting:** Schedule a meeting of the various security directors, radiation control directors, and administrators from industry, medicine, and research with the state radiation control program officials, police, fire, emergency medical services, federal, state, and local law enforcement intelligence representatives and other public safety partners. The purpose of the meeting is to explain the proposed law enforcement role, meet the stakeholders, and seek feedback and input into how to collaborate on increasing radiation material security.
- 3) **Site Visits:** The locations where the radiological materials are stored are visited by police, fire, and EMS and public safety experts. During the site visit, potential problems are identified along with good practices. The site visit is not only an opportunity to walk through the physical location where radioactive materials are stored and observe security procedures; it is also helpful in gauging response in case of an accident or sabotage. Members of the site visit team should include police officers or homeland security officials who have been trained in vulnerability analysis and risk assessment.
- 4) **Collaborate on Response Plan:** A police department supervisor trained in hazardous materials collaborates with the facilities security director on the response plan and receives the plan. The plan and facility layout with exact locations of materials and security measures will be considered law enforcement sensitive and not subject to public disclosure. Information

developed on possible terrorist targets or suspicious activity will be shared with the regional intelligence center and state fusion center.

- 5) **Create a Functional Group within the Intelligence Fusion Center:** A radiation security network functional group should be established in the regional intelligence center. Focused customer services are one of the keys to a successful intelligence system. Protocols need to be established and background checks need to be conducted for private sector personnel, with these personnel fully integrated into the center as partners.
- 6) **Train and Exercise:** Tabletop exercises will be developed with the cooperation and participation of security directors to evaluate the effectiveness of the plans from both the public safety and private sector perspectives. Additional training and exercising of response plans, such as red teaming and a field response exercise, will be planned with police partners. The exercises are a means of evaluating the response plans. Information from the after-action critiques will be used to address issues that arise in the exercises.

## H. CONCLUSION

Richard Falkenrath and others have made the argument that WMD terrorism is a “low probability, high consequence threat.”<sup>142</sup> In terms of WMD’s, creating a biological weapon and an effective delivery system, or obtaining sufficient chemicals or creating a means of mixing chemicals to create a desired reaction that results in a lethal weapon, present formidable operational challenges. However, the relative simplicity and availability of radioactive materials make an RDD the most likely unconventional weapon that Americans may be threatened with. The terrorists would merely be adding an additional component to existing technology. Their successful use of the weapon would demonstrate their movement’s power and prestige. The *New York Times* recently reported that it had obtained a transcript of Khalid Shaikh Mohammed’s confession to CIA interrogators that dirty bomb operations on American soil were being planned by al Qaeda.<sup>143</sup>

---

<sup>142</sup> Richard A. Falkenrath, Robert D. Newman, and Bradley A. Thayer, *America’s Achilles Heel, Nuclear, Biological and Chemical Terrorism and Covert Attack*, (Cambridge, MA: MIT Press, 1998), 41.

<sup>143</sup> Adam Liptak, “Suspected Leader of Attacks on 9/11 Said to Confess,” *New York Times*, March 15, 2007.



Even if the overall probability is low, the consequences of such an attack could be devastating to the American psyche. Terrorists ultimately aim to instill fear. A radiological weapon, containing a sufficiently strong radioactive element such as cobalt 60, could render an area uninhabitable for decades. The increased level of cancer rates that accompany exposure to radiation would prolong fear in the area. As we saw after the incident at Chernobyl, young children and pregnant woman would suffer disproportionately following such an attack. The full effects may not be apparent until the next generation is born, providing a haunting reminder of the original attack.

This nation might react to such an attack in an unpredictable manner, much as a parent watching a child suffer may lash out. Civil liberties could be curtailed or a new war could be launched against nations that support, or are perceived to support, terrorists. Media coverage of the incident would be unprecedented. The pressure would be on the United States to respond forcefully. This could even be the ultimate goal of the terrorists' attack: to provoke the United States into another military action.

The Department of Homeland Security is devoting significant resources to the dirty bomb threat. It estimated that three billion dollars will be spent on deploying radiation detection technology in the next few years.<sup>144</sup> The Securing the Cities Initiative is set to begin in New York City. Radiation detection equipment will be deployed at the major access points into the city. Detectors are being installed to screen all cargo containers at our seaports and all trucks at our border crossings.<sup>145</sup> While these efforts are certainly worthwhile, our strategy to protect America has to focus on not only detection but also on denying access to material.

Our ultimate goal should be a multi-layered approach focusing not just on response but on prevention as well. A strong national intelligence system should be the backbone of our prevention program. Groups who fit the profile for using these types of weapons should be prioritized for investigation. Border security has been woefully

---

<sup>144</sup> United States Department of Homeland Security, "DHS Announces Major Investment in Next-Generation Radiological Detection Equipment," Press Release July 14, 2006, <http://www.dhs.gov.dhspublic/display/htm>, [Accessed July 17, 2006].

<sup>145</sup> Ibid.

inadequate in terms of protecting our ports and containers from radioactive material smuggled into America.<sup>146</sup> The NRC has attempted to increase radioactive security by involving local police agencies, but more needs to be done in terms of creating public/private partnerships in radiation security. Many of our most dangerous radioactive elements are contained in hospitals with relatively light security. The dangers posed by radiation are poorly understood by the public and even by many public safety personnel. A preparedness campaign should inform people of what steps they could take to mitigate the effects of an attack without scaring the public unnecessarily. Education campaigns need to be conducted for security personnel in industry, medicine, and research on how they can help prevent materials from getting into the hands of terrorists. Radiological terrorism is a legitimate threat and may be the ultimate inexpensive and technologically feasible mass casualty unconventional weapon that terrorists wield in the 21<sup>st</sup> century. The role of local police is changing rapidly and will continue to do so as the country faces new threats in an increasingly dynamic and global environment. Local police will need to constantly redefine their policing roles and increase partnerships and information and intelligence sharing to deal with new threats. Local police agencies are responding and taking on this new role. Police in Boston and London have already recognized the radiological threat and have conducted site visits and created partnerships with universities and hospitals in an effort to increase security of materials. The threat of terrorism is but one of the new international threats we face. Global criminal cartels involved in narcotics trafficking have sought to undermine legitimate governments and also acquire weapons and have increasing ties to terrorism. The future will require the police to collaborate and create networks to defeat the terrorist and criminal networks that are threatening America.

The adoption of the proposed strategy of a public safety and private security partnership is in concurrence with the President's *National Strategy for Homeland Security*. It is of critical importance to integrate our local actions with state, federal, and especially the private sector to prepare for, respond to, and most importantly prevent

---

<sup>146</sup> United States Government Accountability Office, "Border Security: Investigators Successfully Transported Radioactive Sources Across Our Nation's Borders at Selected Locations" GAO 06-545R (Washington, DC: Government Accountability Office, March 28, 2006).

terrorist attacks using radiological material. Private security protects and operates the majority of this country's critical infrastructure, key resources and chemical, biological, and nuclear materials and industries.<sup>147</sup> This strategy proposes a means to incorporate private security into a radiological security intelligence network. Information can be collected, analyzed, and shared through regional and state fusion centers with our local law enforcement and private security partners, and then forwarded to the new national Department of Nuclear Detection Office.

A recent GAO study has identified security weaknesses at locations where radioactive materials are held in lightly guarded environments such as hospitals.<sup>148</sup> Local public safety personnel, police, fire, and emergency medical services will be the first responders to a terrorist event involving radioactive material. This proposed strategy recognizes their primary role in the development and implementation of additional security for radiological sources.

Budgets at all levels of government are constrained. We have to develop ways to leverage the knowledge and resources of our federal, state, local, and private partners to keep these sources of radioactive materials from terrorist use. Funding for homeland security has been cut 30 percent in the Boston UASI region and may be further reduced in the future; other major metropolitan areas have faced similar reductions. Building sustainable, collaborative networks and sharing our limited resources may be our best option for securing our cities from terrorist attacks.

This thesis answers the question of how local police can increase radiological security by collaborating with private security. By using the proven community policing model, based on partnerships, intelligence, and education, this research proposes a model for local police to use in response to the federal government's requirements for greater security for radiological material. This thesis proposes a strategy that would be a low-cost means to increase radiological security by developing a security network where the police are sharing the workload and information among various public and private

---

<sup>147</sup> Department of Homeland Security, *National Infrastructure Protection Plan*, June 30, 2006, 10.

<sup>148</sup> *Ibid.*, 5.

partners. Local intelligence centers, or fusion centers, can lead this effort by working with the state radiological control program to identify source sites, assess the threat posed by the source material and type of facility, and make security recommendations based on this analysis. The regional intelligence center would serve as an information sharing platform and provide overall guidance to the network.

The emotional, psychological and economic “fallout” from a radiological terrorist attack would be devastating to this country. This thesis proposes a model for local police agencies to help prevent radiological material from getting into the hands of terrorists. Intelligence-led policing will transform the future role of local police from being “first responders” to “first preventers” of terrorist acts.

## **IV. FUTURE AREAS OF RESEARCH**

Further research is recommended in the following areas:

- Measure the effectiveness of the proposed collaborative strategy. Security effectiveness could be measured through exercises. Before and after comparison studies could be conducted. Surveys of private security and facility personnel could be conducted as a measure of the policy on raising situational awareness.
- Create and analyze intelligence sharing protocols among public and private partners. This analysis should address the continuing dilemma of the “need to know” versus the “need to share,” and potential restrictions on sharing intelligence with private partners as well as the impact on security.
- There are many similarities between security in the radiological and chemical industries. Future research on expanding the model for increasing security for chemical plant security is also necessary.

THIS PAGE INTENTIONALLY LEFT BLANK

## BIBLIOGRAPHY

- “Advisories and Orders.” *Frequently Asked Questions About NRC’s Response to Events after 9/11*. U.S. Nuclear Regulatory Commission website, <http://www.nrc.gov/security/faq-911.html>, [Accessed May 14, 2007].
- Anet, Bernard. “Assessing the Risk of Radiological Terrorism, How Real is the Threat?” Research Paper presented at the Fourth Annual Chemical and Biological Treatment Symposium, Vienna, April 2002.
- Anonymous. “Anti-Terror Cops Inspect Nuclear University.” *UK News*, December 27, 2006. [www.lse.co.uk](http://www.lse.co.uk), [Accessed February 21, 2007].
- Anonymous. “Dirty Bomb Seen Creating Mass Havoc, According to Year Long Pentagon Study.” *Law Enforcement News* 30, no. 616 (Spring 2004).
- Anonymous. “Feds Remove Cesium from New England Site.” *United Press International*, December 29, 2007.
- Arquilla, John and David Ronfeldt. *Networks and Netwars: The Future of Terror, Crime and Militancy*. Santa Monica CA: Rand Corporation, 2001.
- Atomic Energy Act of 1954. Public Law 83-703, Section 274b. 68th Cong., 2d sess. (August 30, 1954).
- Bale, Jeffrey M. “The Chechen Resistance and Radiological Terrorism” Nuclear ThreatInitiative website, [www.nti.org](http://www.nti.org), [Accessed March 7, 2007].
- Bardach, Eugene. *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*, 2nd Ed. Washington, DC; CQ Press, 2005.
- British Home Office Terrorism Bill. Parliamentary Bill 55, April 2006.
- Broderick, Kristen. “ABC Studies Kansas State University, 24 Other Schools Nuclear Reactors.” *Kansas State Collegian*, October 14, 2005.
- Burton, Fred. “Tactical Implications of the ‘Smoky Bomb’ Threat,” *Stratfor*, January 2, 2007.
- Bush, George W. “Message to the Congress of the United States on Proposed Legislation to Create a New Cabinet Department of Homeland Security.” [www.whitehouse.gov](http://www.whitehouse.gov). [Accessed June 18, 2003].

- Butler, Adrienne S. Understanding the Psychological Consequences of Traumatic Events, Disasters and Terrorism. Washington DC: National Academy of Sciences, 2003.
- Center for American Progress. "Center for American Progress and Foreign Policy Magazine Terrorism Survey." Foreign Policy, June 2006. [www.ForeignPolicy.org](http://www.ForeignPolicy.org), [Accessed March 13, 2006].
- Center for Disease Control and Prevention, Department of Human Health and Services, Emergency Preparedness and Response. "Radioactive Contamination and Radiation Exposure." [www.bt.cdc.gov/radiation/contamination.asp](http://www.bt.cdc.gov/radiation/contamination.asp), [Accessed February 20, 2007].
- City of London Police Authority. Local Policing Plan 2005-2008. London, England: City of London Police Authority, 2005.
- Combating Terrorism Center, Department of Social Services. Harmony and Disharmony: Exploiting al-Qa'ida's Organizational Vulnerabilities.
- United States Army Military Academy at West Point, February 14, 2006.
- Conference of Radiation Control Directors. First Responders Guide: Radiological Dispersal Device. CRCPD Publication #06-RDD-c. [www.crcpd.org](http://www.crcpd.org), [Accessed February 11, 2007].
- Cordesman, Anthony H. Defending America, Asymmetric and Terrorist Attacks with Radiological and Nuclear Weapons. Washington DC: Center for Strategic Studies and International Studies, 2001.
- Daly, Sara, John Parachini and William Rosenau, "Aum Shinrikyo, Al Qaeda and the Kinshasa Reactor, Implications of Three Case Studies for Combating Nuclear Terrorism" Project Air Force Research Brief. Santa Monica CA: RAND Corporation, 2004. [www.rand.org](http://www.rand.org), [Accessed May 6, 2007].
- Dell'Orto, Giovanna. "Alleged Terrorist Plot Detailed." Boston Globe, June 30, 2006.
- Department of Homeland Security. "DHS Announces Major Investment in Next Generation Radiological Detection Equipment," Press release, July 14, 2006, <http://www.dhs.gov/dhspublic/display>, [Accessed July 17, 2006].
- Department of Homeland Security. National Infrastructure Protection Plan. Washington, DC: Department of Homeland Security, June 30, 2006.
- Donohue, Michael P. "Understanding the Dirty Bomb and Its Policy Implications." Homeland Security Law and Policy, William C. Nicholson ed. Springfield, IL: Charles C. Thomas, 2005.



- Dwyer, Jim. "NYC Police Spied on Ralliers Before GOP Convention." New York Times, March 25, 2007.
- Ellis, James O. "America's Critical Infrastructures: Open Source Information Lays It Out." The Monthly Terrorism Center Update, September 2006. [www.mipt.org](http://www.mipt.org), [Accessed June 14, 2007].
- Environmental Protection Agency. Orphaned Source Initiative. <http://www.epa.gov/radiation/cleanmetals/orphan.htm>, [Accessed June 13, 2007].
- Ervin, Clark Kent. "The Usual Suspects." New York Times, June 27, 2006.
- Eschbacher, Karen. "Experts Say Dirty Bombs are more Disruptive than Destructive." The Patriot Ledger, January 20, 2005.
- Falkenrath, Richard, Robert D. Newman and Bradley A. Thayer. America's Achilles Heel, Nuclear, Biological and Chemical Terrorism and Covert Attack. Cambridge, MA: MIT Press, 1998.
- Federal Bureau of Investigation. Crime in the United States, 2005. Washington, DC: United States Department of Justice, September 2006.
- Feldman, Noah. "Islam, Terror and the Second Nuclear Age." New York Times Magazine, October 29, 2006.
- Ferguson, Charles D. and Joel O. Lubenau. "Securing U.S. Radioactive Sources." Issues in Science and Technology 20, no. 1, (Fall 2003).
- Ferguson, Charles D., William C. Potter, Amy Sands, Leonard S. Spector and Fred L. Wehling. The Four Faces of Nuclear Terrorism. Monterey, CA: Monterey Institute for International Studies, Center for Nonproliferation Studies Nuclear Threat Initiative, 2004.
- Ferguson, Charles D., Tahseen Kazi and Judith Perera. Commercial Radioactive Sources: Surveying the Security Risks, Occasional Paper No. 11. Monterey, CA: Monterey Institute of International Studies, Center for Nonproliferation Studies, January 2003.
- Fox, James Allan. "Wall Needed between Politics and Policing: President's Commitment to Constabulary is Cop Out." Boston Herald, July 17, 2006.
- Garrett, Laurie. Betrayal of Trust: The Collapse of Global Public Health. New York: Hyperion, 2000.
- Geller, William A. ed. Local Government Police Management, 3rd Ed. Washington, DC: International City Management Association, 1991.

- Government Accountability Office (GAO). U.S. and International Efforts to Control Sealed Radioactive Sources Need Strengthening. GAO-03-638. Washington, DC: Government Accountability Office, August 2003.
- Grotto, Andrew J. Defusing the Threat of Radiological Weapons: Integrating Prevention with Detection and Response. Center for American Progress, July 2005.  
[www.americanprogress.org](http://www.americanprogress.org), [Accessed June 2, 2007].
- Gurr, Nadine and Benjamin Cole. The New face of Terrorism: Threats from Weapons Of Mass Destruction. New York: I.B. Taurus and Co. Ltd., 2005.
- Hall, Eric, J. Radiation and Life. New York: Columbia University, 2002.  
[www.uic.com.au/ral.htm](http://www.uic.com.au/ral.htm), [Accessed February 11, 2007].
- Hoffman, Bruce. Inside Terrorism, Revised and Expanded Ed. New York: Columbia University Press, 2006.
- International Association of Chiefs of Police. Criminal Intelligence Sharing: A National Plan for Intelligence-Led Policing at the Local, State and Federal Levels. Washington, DC: United States Department of Justice, Office of Community Oriented Policing, August 2002.
- International Atomic Energy Agency. Inadequate Control of World's Radioactive Sources, June 24, 2002,  
[www.iaea.org/newscenter/pressreleases/2002/prn/0209.shtml](http://www.iaea.org/newscenter/pressreleases/2002/prn/0209.shtml), [Accessed June 11, 2007].
- International Atomic Energy Commission. The Radiological Accident in Goiania. Vienna, Austria: International Atomic Energy Commission, 1988.
- Jane's Information Group. "Radioactive Material and Terrorism." Jane's Terrorism and Security Monitor, February 16, 2005.
- Kahron, Tony. "Person of the Week: Jose Padilla." Time, June 14, 2002.
- Kaplan, David E. "When the Cops Only Saw Red." U.S. News and World Report, May 8, 2006.
- Kaplan, David E. "Spies Among Us: Despite Troubled History, Police Across the Nation are Keeping Tabs on Ordinary Americans." U.S. News and World Report, April 30, 2006.
- Karan, P. Andrew. "Radiological Terrorism." Human and Ecological Risk Assessment 11 (2005).

- Kean, Thomas Chairman. The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks Upon the United States. New York: W.W. Norton & Co, 2004.
- Kelling, George L. and Mark H. Moore. "The Evolving Strategy of Policing." Perspectives on Policing. Washington, DC: National Institute of Justice, 1988.
- Kelling, George L. and William J. Bratton. "Policing Terrorism." Manhattan Institute for Policy Research, Civic Bulletin No. 43, September 2006.
- Kelly, Dr. Henry, President of the American Federation of Scientists. Testimony before the Senate Foreign Relations Committee, March 6, 2002. [www.fas.org/maincontent](http://www.fas.org/maincontent), [Accessed March 27, 2007].
- Kim, W. Chan and Renee Mauborgne. Blue Ocean Strategy. Boston, MA: Harvard Business School Press, 2005.
- Klausen, Jyette. British Counter-Terrorism After the July 2005 Attacks: Adapting Community Policing to the Fight Against Domestic Terrorism. United States Institute of Peace, <http://www.usip.org/pubs>, [Accessed February 27, 2007].
- Libicki, Martin L., Peter Chalk and Melanie Sisson. Exploring Terrorist Targeting Preferences. Santa Monica, CA: RAND Corporation, 2007.
- Liptak, Adam. "Suspected Leader of Attacks on 9/11 Said to Confess." New York Times, March 15, 2007.
- Margasak, Larry. "Security Industry Called Beset by Low Pay, Training." Boston Globe, June 3, 2007.
- Massachusetts Department of Public Health Radiation Control Program, Inspection Enforcement and Security Branch. "Increased Controls." Law Enforcement Presentation and Handouts, Boston, MA, March 30, 2006. [Designated Law Enforcement Sensitive Information not for Public Release.]
- Miller, Patrick. "Community Policing has Security Benefits." Ventura County Star, February 12, 2005.
- Murphy, Kim. "Ex-KGB Agent Sought on Poisoning Death." Los Angeles Times, May 24, 2007.
- National Commission of Law Observance and Enforcement. Report on Lawlessness in Law Observance and Enforcement, Report on Lawlessness in Law Enforcement. Washington D.C.: Government Printing Office, 1931. [www.LexiNexis.com](http://www.LexiNexis.com), [Accessed February 15, 2007].

- National Institute of Justice. "Hiring and Keeping Police Officers." NCJ 202289. NIJ Research for Practice, July 2004.
- Nuclear Regulatory Commission (Docket Nos: Redacted). "In the Matter of all Licensees Authorized to Possess Radioactive Material Quantities of Concern, Order Imposing Increased Controls." (Effective Immediately) Attachment A. Federal Register 71, No 98, Monday May 22, 2006, Notices, Note: Attachment A contains sensitive information and will not be released to the public.
- Office of the White House, Department of Homeland Security. "Domestic Nuclear Detection Office Fact Sheet." <http://www.fas.org/irp/offdocs/nspd/nspd43fs.html>, [Accessed June 11, 2007].
- Oppenheimer, Andrew. "The Radiological Threat Widens." Jane's Terrorism and Security Monitor, Special Report, September 1, 2004.
- Parfomak, Paul W. Guarding America: Security Guards and U.S. Critical Infrastructure Protection. RL 32670. Washington, DC: Congressional Research Service, November 12, 2004.
- Pincock, Stephen. "Terrorists Using Dirty Bombs to Spread Radiation are a Chilling Prospect. But is the Fear Justified by the Actual Danger They Pose?" Financial Times, September 10, 2004.
- Pinkston, Randall. "FBI: Violent Crime on the Rise," CBS NEWS, June 2, 2007. <http://www.cbsnews.com/stories/2007/06/02/eveningnews/printable2878844.shtml>, [Accessed June 4, 2007].
- President's Commission on Law Enforcement and Administration of Justice. The Challenge of Crime in a Free Society. Washington, DC: Government Printing Office, 1967. [www.LexisNexis.com](http://www.LexisNexis.com), [Accessed February 15, 2007].
- Radin, Charles A. "From N.H. to Somalia: Recalling a Suspect's Zeal." Boston Globe, February 17, 2007.
- Ratcliffe, Jerry H. "Intelligence-led Policing." Trends and Issues in Criminal Justice, April 2003. <http://www.aic.gov.au>, [Accessed February 15, 2007].
- Richardson, Michael. "Weapons of Mass Disruption Await." New Zealand Herald, October 6, 2005.
- Riley, K. Jack , Gregory F. Treverton, Jeremy M. Wilson and Lois M. Davis. State and Local Intelligence in the War on Terrorism. Santa Monica CA: Rand Corporation, 2005.
- Ruddock, Philip. "Better Community Policing Would Improve Security." Financial Times, Australian Associated Press Newsfeed, July 31, 2005.

- Simon, Bob. "Who Killed Alexander Litvinenko?" CBS News, London, January 7, 2007. [www.cbsnews.com/stories/2007/01/05/60minutes/](http://www.cbsnews.com/stories/2007/01/05/60minutes/), [Accessed January 8, 2007].
- Smalley, Suzanne. "Hub's Rise in Deadly Violence Reflects a Disturbing US Trend." Boston Globe, March 9, 2007.
- Smith, Gregory. "Community Policing Guru Issues Warning." The Providence Journal, March 2, 2006.
- Sparrow, Malcolm K. The Regulatory Craft, Controlling Risks, Solving Problems and Managing Compliance. Washington DC: Brookings Institute Press, 2000.
- Stern, Jessica. The Ultimate Terrorists. Cambridge MA: Harvard University Press, 1999.
- Sullivan, John P. "Terrorism Early Warning and Co-Production of Counterterrorism Intelligence." Research Paper presented at the Canadian Association for Security and Intelligence Studies International Conference on October 21, 2005 in Montreal, Canada.
- Swanson, C., L. Territo, and R. Taylor. Police Administration, Structures, Processes and Behaviors. New York: MacMillan Publishing Co., 1993.
- United States Department of Energy Web Site, <http://www.ernergy.gov/nationalsecurity/wmd.htm>, [Accessed June 13, 2007].
- United States Department of Homeland Security, Office of the Press Secretary. "DHS Announces Major Investment in Next-Generation Radiological Detection Equipment." Press Release, July 14, 2006, <http://www.dhs.gov.dhspublic/display/htm>, [Accessed July 17, 2006].
- United States Department of Justice. Fusion Center Guidelines: Developing and Sharing Information and Intelligence in a New World, Washington, DC: Department of Justice, 2005.
- United States Department of Justice. Bureau of Justice Statistics webpage, <http://www.ojp.usdoj.gov/bjs/>, [Accessed March 16, 2007].
- United States Government Accountability Office. Border Security: Investigators Successfully Transported Radioactive Sources Across Our Nation's Borders at Selected Locations. GAO 06-545R. Washington, DC: GAO, March 28, 2006.
- United States General Accounting Office Nuclear Security: Federal and State Action Needed to Improve Security of Radioactive Sources. GAO-03-804. Washington, DC: GAO, August 2003.

- United States Government Accountability Office. Nuclear Nonproliferation: U.S. and International Efforts to Control Sealed Sources Need Strengthening. GAO-003-638. Washington DC: GAO, 2003.
- United States Government Accountability Office. Combating Nuclear Smuggling: Efforts to Deploy Radiation Detection Equipment in the United States and in Other Countries. GAO-05-840T. Washington, DC: GAO, June 21, 2005.
- United States Government Accountability Office. Nuclear Security: Federal and State Action Needed to Improve Security of Sealed Radioactive Sources. GAO-03-804. Washington, DC: GAO, August 2003.
- United States Government. National Strategy for Combating Terrorism. Washington, DC: Government Printing Office, September 2006.
- United States Nuclear Regulatory Commission. Order Imposing Increasing Controls. Docket EA 05-090. Washington, DC: NRC, November 14, 2005.
- US Fed News. "Al Qaeda Publishes Online Dirty Bomb, How to Guide." US Fed News, September 1, 2006.
- Van Tuyle, Gregory J., Tiffany L. Strub, Harold A. O'Brien, Caroline F. V. Mason and Steven J. Gitomer. Reducing RDD Concerns Related to Large Radiological Source Applications. LA-UR-03-6664. New Mexico: Los Alamos National Laboratory, September 2003.
- Wagner, Thomas. "ElBaradei: Protect Nuclear Material." Associated Press, December 6, 2006 <http://www.iiss.org/index.asp>, [Accessed June 4, 2007].
- Wexler, Chuck. A Gathering Storm: Violent Crime in America. Washington, DC: Police Executive Research Forum, 2006.
- Willing, Richard. "Nuclear Traffic Doubles Since '90s." USA Today, December 25, 2005.
- Zagorin, Adam and Elaine Shannon. "London's Dirty Bomb Plot." Time, October 3, 2004.

## **INITIAL DISTRIBUTION LIST**

1. Defense Technical Information Center  
Ft. Belvoir, Virginia
2. Dudley Knox Library  
Naval Postgraduate School  
Monterey, California
3. Commissioner Edward Davis  
Boston Police Department  
Boston, Massachusetts
4. Juliette Kayyem, Undersecretary of Homeland Security  
Executive Office of Public Safety  
Boston, Massachusetts
5. Mayor's Office of Emergency Preparedness  
Boston City Hall  
Boston, Massachusetts